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Fuel Economy.

PULVERISED-fuel *versus* stoker firing, the storage or unit system of p.f. firing, and the relative merits of chain-grate and retort methods of stoker firing; these are probably the main issues which are exercising the minds of most supply engineers to-day on the question of fuel economy. The idea of combining the two main methods of firing (p.f. and stoker) must also be looked into. This scheme has already met with considerable success in a few cases in this country, and the decision to adopt it at the new Liverpool station has been arrived at after experience with it at Lister Drive. The forming of one unit from the best of a number is almost a basic ideal in the engineering mind, and we confess to a leaning towards the combined system.

With the broader issue is involved consideration of the classes of fuel available for use. There is little doubt that where it is desirable to use fuel of round about 10,000 B.th.u. calorific value there is a strong case for pulverisation. Irrespective of grade, also, coal seems to be burnt most satisfactorily in the powdered form in very large boilers; above 400,000 lb. per hour was the capacity figure mentioned by Dr. S. L. Pearce in his contribution to the discussion on Mr. G. H. Lake's paper at the I.M.E.A. Convention at Eastbourne this year. The powdering of better-class coal for use with boiler units of the sizes more commonly used in this country does not, however, represent such a straight problem, particularly in view of recent developments in mechanical-stoker design and production. Flexibility and easy control of the combustion conditions are points put forward by the advocates of p.f. firing. True, these are important points, and in many cases deciding factors, but witnessing what is being done by mechanical stokers in some modern installations cannot fail to influence, if not modify, one's impressions on this question. At the Deptford power stations of the London Power Co., Ltd., which were included in a programme of works visits carried out with conspicuous success under the auspices of the Institute of Fuel on Thursday last week, stoker boilers were seen which deal, normally and without trouble, with minute-to-minute station steam-demand

variations of between 200,000 and 300,000 lb. per hour.

The Barking station of the County of London Electric Supply Co. was also visited. Barking has been running almost entirely on its p.f. plant during the past few months, and with considerable success; it is whispered that the powdered-coal principle will be continued in the new Barking B station. We learn that the County Co. has not yet been able to find a sale for ash from its p.f. plant—a small but important point that must be considered under fuel economy.

Whatever is said for or against pulverised fuel, one thing is certain, its introduction has led to an all-round increase in boiler-house efficiency; it is complimentary to the newer firing method that the modern tendency in the design of units for stoker firing is to follow the lines adopted for p.f. firing, particularly in surrounding the furnace with boiler-heating surface. Further, capital costs must always have a vital bearing on the fuel-economy question, and in this connection it should be remembered that the newer system of firing is still too young for it not to be influenced by heavy pioneering expenses.

With regard to the much debated question of the storage *versus* the unit system of firing, it is very interesting to learn from Mr. R. A. Chattock that it was the drying troubles of the storage system which led him to adopt the unit system at the new Hams Hall station.

We believe that, at any rate until recent years in this country, the retort-type stoker has been regarded as not likely to fill the rôle of meeting successfully the necessarily varying conditions pertaining to ordinary fuels. This is apparently not borne out by the experience at Deptford, where there are chain-grate and retort stokers working side by side giving equally satisfactory results: it may be significant that retort stokers are to be adopted for the new extensions at Deptford (West).

The mixing of coals of different grades in stoker firing is an important art of the fuel economist, and bearing on this it is particularly interesting to learn that at two large and modern station groups, including Deptford, experience has shown that there is very little difference, if any, in the results obtained from the scientific sandwiching of coals and their more or less indiscriminate mixing.

Inter-Commonwealth Trade.

The recent memorandum and recommendations urging that a Commonwealth Trade Conference be held at an early date form an impressive document. Both the Trade Union Congress and the Federation of British Industries have found common ground upon which they can make a firm and definite stand—the urgency of the need for taking all possible steps for increasing inter-Commonwealth trade

The Imperial Economic Conference is now sitting, and the decisions there arrived at must have a great effect upon the future development of the enormous resources and economic possibilities of the British Commonwealth. At such a time, therefore, it is an event of more than ordinary significance that two great partners in industry should find it not only possible, but necessary, to make a convincingly-worded pronouncement of their views to H.M. Government on a matter concerning which they are absolutely united. They call for a Conference of an investigatory, an advisory, and non-party nature, of persons nominated by each Government in the Empire, "to examine the problem of inter-Commonwealth trade with a view to laying down a sound basis for Commonwealth economic policy," to consider the mass of detailed questions entering into Commonwealth trading relations, and to act as a medium for forming constructive proposals for the guidance of the Governments. An Economic Secretariat is suggested as a permanent body to report upon steps taken and to give effect to decisions arrived at. The purpose aimed at is to provide adequate machinery, which does not exist at present, for dealing with problems of vital importance.

Students of all the wealth of literature that has appeared during the past decade or two regarding the vastness of Empire resources and the desirability for economic unity in development will regard these recommendations as being natural, common-sensible, and urgent. Great as the immediate need of our industries at home may be, this is a matter in which we must act as men of vision, so great may be the consequences for the years to come.

The Radio Exhibition.

In this issue we conclude our review of the exhibits at the National Radio Exhibition. We also publish an article by Mr. P. K. Turner, giving his impressions of technical progress and tendencies as thereby indicated.

Two of the observations of our contributor seem to us especially noteworthy. The first is that full advantage is taken of the pentode valve only when used under constant-current conditions; the other is that with the mains-operated set there is no need to restrict the energy output. These developments have not been exploited to the full in all the instruments shown, but in the case of the mains sets increased output would result in disproportionately better results both for listeners and for supply undertakings.

Referring to the introduction of improved permanent magnets for moving-coil loud-speakers, Mr. Turner lays most stress on the advantage of price reduction, but we are inclined to attach importance also to the more consistent performance which may be expected throughout the life of the electro-magnet type.

Last week in our leading columns we referred to the passing of the inferior type of retailer of radio apparatus. This evolutionary process, it should be emphasised, is by no means necessarily automatic, and the present tendency will be confirmed only if the better class of contractor makes up his mind at once to grasp the opportunity now offered of securing the whole of this business.

The Municipal Tramways Association.

It is now 60 years since the first Tramways Act was passed. The "diamond jubilee" has been signalised by the passing of the Road Traffic Act, which Alderman Thomas Canby, in his presidential address to the Municipal Tramways and Transport Association last week, referring to the sweeping away of local licensing authorities, described as the most beneficial massacre in the history of local government. It amply fulfils the desire of last year's president, Mr. Wm. Chamberlain. for an over-riding authority vested with the necessary powers to secure conformity in each regional area.

In order that the new Act may achieve its purpose, it will be necessary for those responsible for its working to have clear ideas as to what is the most suitable type of vehicle for any set of circumstances. To secure agreement on this point may be impossible, as the president holds, but it is, nevertheless, incumbent upon electrical engineers to ensure that the case for the electrically-propelled vehicle shall be properly considered. We propose to return to the subject in a later issue.

Autumn.

With the end of Summer Time on Sunday next, what is in some directions the busiest period of the year will commence. The engineering institutions and kindred societies will begin their winter sessions, the Institution of Electrical Engineers holding its first meeting on October 23rd. The Law Courts resume activities on October 13th after the Long Vacation, and Parliament re-assembles on October 28th to be faced with many unsolved problems.

The dinner season is also rapidly approaching, one of the first of the premier electrical banquets being the E.T.B.I. annual festival on November 12th, followed a week later by that of the B.E.A.M.A.

Electricity Supply in Dunoon.

A Description of the Undertaking which was Formally Inaugurated on Sept. 15th.

By DONALD SMEATON MUNRO, M.I.E.E.

DUNOON is one of the most popular watering places on the Firth of Clyde. It is pleasantly placed before a background of Argyllshire mountains, and from its twin bays there are magnificent views of the estuary coasts and its islands (see fig. 1). As a holiday resort it is only now being discovered by many English visitors, but, ever since steamboats have sailed down the Clyde, the town has drawn increasing crowds of health and pleasure seekers from the industrial centres of Scotland. The winter residential population of Dunoon is about 10,000, and during the long summer season the temporary population reaches 50,000.

Fig. 1.—View of the East Bay, Dunoon.

Until now Dunoon has been the largest town in Scotland lacking a general electricity supply. The burgh was granted a Provisional Order by the Board of Trade in 1906, but it was allowed to lapse. After the war there was a proposal to take a bulk supply from Greenock, but the cost of duplicate submarine cables across two miles of the Firth to the Cowal peninsula was a very serious obstacle, and the councillors did not feel that the outlay would be justified. Dunoon, therefore, lost the opportunity to be included in the Central Scotland portion of the national grid transmission scheme. In 1928 Mr. George Gillespie, A.M I.E.E., the Scottish manager of Messrs. Johnson & Phillips, Ltd., approached Provost Colin Turner on behalf of his company, and put forward proposals which have developed into the present undertaking. Messrs. James E. Sayers and T. G. Crum, consulting engineers, of Glasgow, were called in, and in a remarkably short time the Dunoon and District Electricity Supply Co., Ltd., was in being and actively proceeding with the work of electrification. The operations are under a statutory Order granted in the autumn of 1929 for the supply of electricity for lighting, heating, and power purposes within the burgh of Dunoon and the nearby towns of Kirn and Hunter's Quay. The scheme has, however, been designed to serve in addition Innellan and Toward, which lie to the south, and Ardnadam and Sandbank to the north, with extensions thence to Kilmun, Strone, and Blairmore, should sufficient demand arise from those more distant districts on the same coastline.

The Generating Station.

The town gasworks, the laundry, the fire station, the cemetery, and now the electricity station, are all situated together in a short street in the northern outskirts of Dunoon. On the ground of amenity, however, there is little reason why the new generating station should be so placed out of the way of visitors. It is of plain but pleasing design and has an office and showroom attached, all faced with a good quality of red brick. The station is a steel and brick structure built on a clay subsoil. Piles were used for the cooling tower and generating set foundations, and there is no vibration when the machines are running. The main building was erected by the local firm of Ewan Cameron & Co., while Grey's Ferro-Concrete Co., Ltd.,

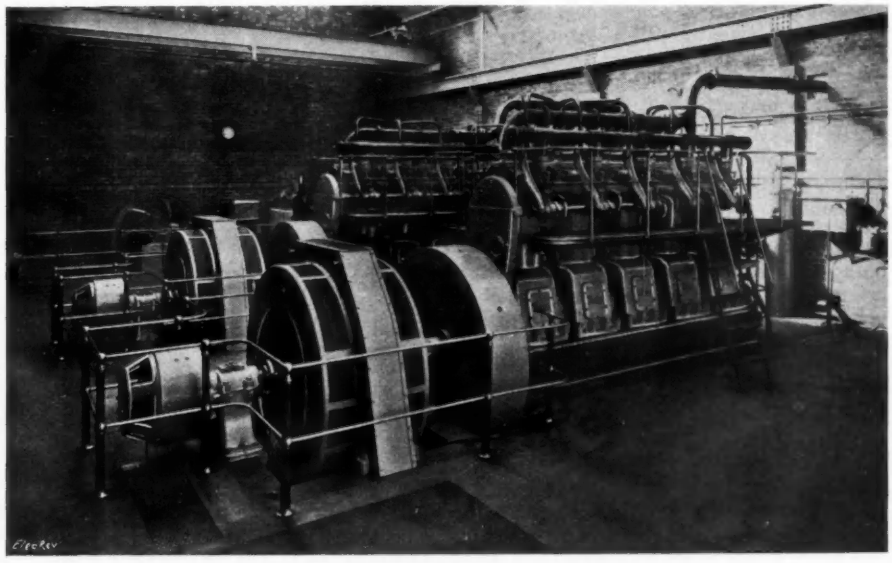


Fig. 2.—The 200-kW Diesel-Alternator Sets.

of Glasgow, supplied the piling, foundations, and ferro-concrete tank.

A 7½-ton travelling crane, of Herbert Morris make, runs the present length of the engine room (fig. 2) which is adapted for extension. The two main engines presently fitted are by Davey, Paxman & Co., of Colchester. They are of the 5-cylinder, 4-stroke, vertical type designed for Diesel fuel oil, cold starting. Each develops 345 b.h.p. at 300 r.p.m. The engines are directly-coupled through flywheels for a cyclic variation of 1/250 to the three-phase, revolving-field B.T.H. alternators. The output of each alternator is 200 kW at .8 power factor, 6,600 volts at 50 cycles. An auxiliary horizontal engine of 20 h.p. operates a compressor for charging the main air bottles, and it also operates a 10-kW direct-current dynamo for standby station lighting and other purposes.

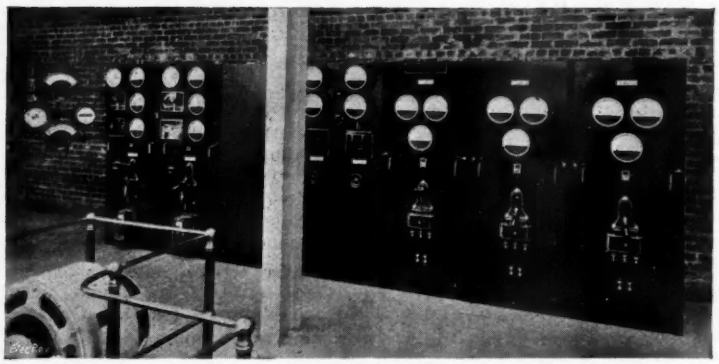


Fig. 3.—High-voltage Switchboard in Engine Room.

The jacket cooling of the Diesel sets is provided for by three motor-driven centrifugal pumps operating in conjunction with a cooling tower and a head tank. The water flows by gravity through the jackets to a hot sump whence it is pumped to the cooling tower and in turn is pumped from the cold sump to the head tank. The three pumps, by valve arrangements, are interchangeable for the two duties. The cooling and auxiliary plant is sufficient for about 1,000 kW, and the station is arranged for extensions up to 1,400 kW, and could be still further extended by taking in more land, which is available.

Fuel Supply.

Somewhat elaborate arrangements have been made for the reception and delivery of fuel oil for the engines; but, as by these means the prime cost of the fuel oil is halved, this expense is amply justified.

A six-inch steel pipe line made by Stewarts & Lloyds, Ltd., is installed from the jetty to a ferro-concrete tank constructed under the esplanade about a quarter of a mile distant. From this tank a three-inch pipe line connects through a small electrically-operated rotary pump to a "Braithwaite" sectional steel tank on the generating station site about three quarters of a mile distant. From this latter tank the fuel oil is automatically supplied, through a meter, to the local engine fuel tanks, which are also provided with measuring apparatus to check the fuel consumption of the individual engines. The capacity of the ferro-concrete tank on the esplanade is about 120 tons. The intention is to receive the fuel in 100-ton lots from coasting tankers. The capacity of the sectional steel tank at the generating station is about 80 tons. The reserve quantity of fuel will be about 100 tons.

The tankers can deliver 100 tons of oil to the esplanade tank in about 45 minutes, and the small rotary pump adjacent to this tank can deliver at the rate of 13 tons per hour to the tank at the generating station. The underground pump chamber, which is of ferro-concrete and immediately adjacent to the oil tank, is provided with a 500-watt heater and a 300-watt fan for ventilation. The six-inch pipe line on the jetty has two connector points to allow a tanker to supply from either of two positions according to the state of the tide.

Switchgear and Cables.

The high-voltage switchgear is of the draw-out cubicle type (fig. 3), and the low-voltage and exciter switchgear of the fixed cubicle type. The distribution cables, high and low voltage, are paper-insulated and lead-covered and armoured.

There are two outgoing high-voltage feeders arranged to serve five transformer kiosks (fig. 4) distributed over the area. One of these kiosks has a capacity of 250 kVA, which can be increased to 500 kVA; the remainder have a capacity of 125 kVA each, which can be increased to 250 kVA. There is in addition a 125-kVA transformer, with the necessary switchgear within the generating station, for serving an adjacent low-voltage network. Additional transformers can also be added here if and when necessary.

The low-voltage networks consist entirely of five-core cables, composed of three phase cores, one neutral and a switch wire for street lighting. These switch wires are arranged for operation through time switches, which may be placed in any of the street section pillars, and thus deal with street lighting in detail as required.

The transformers are delta-star oil cooled, with ratio 6,600/400/230, having tappings on the primary. These, together with the switchgear, the steel kiosks, high- and low-voltage cables, and the section pillars are all of Messrs. Johnson & Phillips make.

Assisted Wiring and Tariffs.

An assisted wiring scheme is in operation and consumers have the option of the following tariffs:—

A flat rate.

A graduated tariff, the price decreasing with the quantity consumed.

A two-part rental tariff.

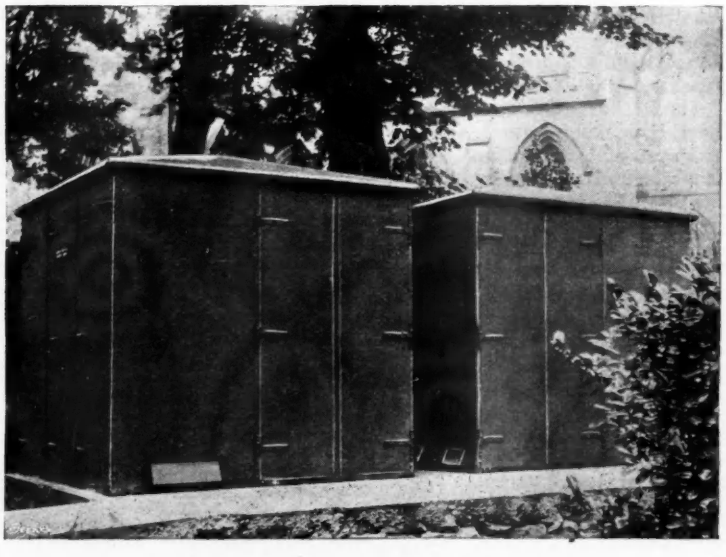


Fig. 4.—Transformer Kiosks in the Castle Gardens.

A restricted-hours service tariff for heating loads which are not coincident with the peak load of the station.

Special rates for shop-window lighting, picture houses, dance halls, &c.

The initial rates, it is hoped, are the maximum; they will be reduced as may be justified by growth of the demand in Dunoon and the entire Cowal peninsula.

Acknowledgments are made particularly to Mr. James E. Sayers, Mr. Charles Stewart, and to Mr. J. Ratcliffe (resident engineer and manager) for their courtesy in supplying technical particulars of the undertaking.

The Inauguration Ceremony.

On Monday, September 15th, Sir Philip Dawson, K.B.E., M.P., presided over a company of about 100 guests at the luncheon held in the Argyll Hotel on the sea front.* The toast of "The Dunoon and District Electricity Supply Co." was proposed by Provost Turner, J.P., who had much to do with the introduction of electricity into the district. He sketched the history of past negotiations, and expressed the complete satisfaction with which he and the Bailies and Council viewed the arrangements which had been arrived at with the principal contractors and their subsidiary company. The chairman in reply to the toast spoke of the comparatively unknown charms of Dunoon, and expressed his confidence that this electrical addition to its amenities and attractiveness would draw more people to the town. He believed that the output of the present station would soon be doubled or even trebled.

Mr. Charles Stewart, M.I.E.E., like the chairman, a director of Messrs. Johnson & Phillips, proposed the toast of "The Burgh of Dunoon" and foretold a future glowing with added prosperity and health aided by the new illuminant. Bailie R. Stewart, J.P., suitably and humorously responded.

The toast of "The Visitors" was proposed by Mr. George Gillespie and was replied to by Mr. A. E. McColl of the Central Electricity Board. Mr. McColl, while glad indeed to see Dunoon join the great fraternity of electrified towns, was a little disappointed that the former negotiations with Greenock had fallen through. He naturally was not in favour of the perpetuation of small stations, and he would hope that at some future date Dunoon would be on the Central Board's list. He thought it appropriate that a town whose chief industry was the purveying of intangible commodities like health and enjoyment should seek the aid of electricity.

Mr. L. Macnaughton, chairman of the Cowal Divisional Committee, also responded to the "Visitors" toast, and was glad that Dunoon was now abreast of the times and could act on the town's motto, which was "Forward."

After luncheon the party was conveyed in cars to the generating station, where Mrs. Colin Turner switched on the supply and was presented by Lady Dawson with a handsome table lamp. After inspecting the station the company was entertained to tea and music in a large marquee. At one end of the marquee a little electrical exhibition was in progress organised by Mr. J. Ratcliffe, resident engineer and manager. In addition to the display of apparatus by the Dunoon and District Supply Co., attractive exhibits were put forward by the Edison Swan Electric Co., by Messrs. Archibald Low and Sons, and by Messrs. Osler & Faraday. In the evening the whole front of the town was illuminated by coloured electric lamps and there was a special fireworks display in the castle gardens to express Dunoon's exuberant feelings about the latest, but not the least, of its attractions.

* Electrical Review, September 19th, 1930 (p. 467).

Cable Protection.

Some methods of protecting a.c. cables under fault conditions are described with a view to illustrating underlying principles.

By A. A. F. GILES.

THE safeguarding of cables against fault conditions is complicated by the types met with. The main types of feeders are (*a*) simple radial feeders, (*b*) radial feeders with branches, (*c*) double and triple feeders, (*d*) ring mains.

The most important consideration is the directions from which current can flow into a fault. With single radial feeders it will be seen that current can only flow from one direction, *viz.*, direct from the generating station. With parallel feeders and ring mains current may be fed both from the generating station direct and from the remaining parallel feeders, or from the other side of the ring in the case of a ring main.

In protecting feeders we are mainly concerned with insulation faults, which may be between phases or between phase and earth. The former are usually very definite and amount to short circuits, but earth faults are usually slow affairs and may take a considerable time to reach overload proportions.

Forms of protection fall into two groups:—(1) Non-discriminating, and (2) discriminating.

By discrimination is meant the ability of the protective arrangements to confine its operation to the feeder it protects, being unaffected by conditions external to the particular feeder.

Ordinary overload protection and earth leakage protection are the usual forms of non-discriminating protection.

Discriminating systems usually depend for operation on a comparison between the currents entering and leaving the ends of a feeder, or the balance between the currents in two parallel feeders of the same characteristics.

Non-discriminating Protection.

Overload protection will safeguard any type of feeder, but is insensitive; the fault current must be well above normal load before the protection is afforded.

With simple radial feeders a certain amount of discrimination may be obtained by grading the relays and reducing the time limits from the generating station outward. In the case of ring mains it is impossible to obtain any discrimination by grading, since it is impossible to forecast where the faults may occur. The chief advantage of overload protection lies in its cheapness.

Fig. 1 shows ordinary triple-pole overload protection applied to a three-phase feeder. It will be seen that in each of the lines current transformers are installed. These transformers are connected in star on their secondary side and either to individual relays or to a triple-pole relay. The relays are also connected in star, and the star point is earthed for safety.

On the current reaching a predetermined limit, above normal load, the relays on the phases concerned will operate (if the current is maintained long enough to exceed the time limit) closing the trip circuit and making the feeder dead. Overload protection is best confined to the smaller distributors, where the overloads usually originate, rather than applied to the protection of trunk feeders. These are best equipped with some discriminating form of fault protection, so that the supply from the protected feeder will be interrupted only by a fault on the feeder itself.

Earth Leakage Protection.—Earth leakage protection is probably the cheapest and simplest protective system it is possible to have. However, it lacks any features of discrimination and is applicable only to simple radial feeders.

Fig. 2 shows the method applied to one end of a three-phase feeder. It will be seen that a current transformer is connected in each phase, their three secondary windings being bunched together; in parallel with the current transformers is connected the protective relay. Under normal conditions, that is with no appreciable leakage

to earth, the sum of the currents at any instant in the three-phase lines will be zero. The current transformer secondary windings, therefore, form a closed circuit, and no current will flow in the external relay circuit. On the occurrence of an earth fault, the fault current

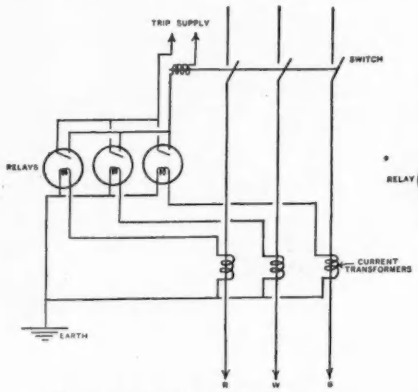


Fig. 1.—Overload Protection Applied to Feeder.

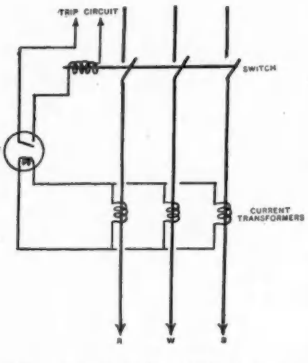


Fig. 2.—Earth Leakage Protection.

will be drawn from one or more of the three-phase lines and will flow *via* earth back to its source. In consequence, the currents in the current-transformer secondary windings will no longer balance, and the excess current will flow through the relay circuit, operating the tripping gear, if of sufficient magnitude. By this means it is possible to obtain protection with a fault current as small as 5 per cent. of the full-load current.

In order that the relay shall not operate on heavy load currents it is essential that the current transformers used should have exactly the same characteristics with regard to phase angle and ratio errors.

By a suitable arrangement of the connections and relays it is possible to obtain overload protection combined with earth-leakage protection if so desired. The overload protection is confined to two of the lines only, but since an overload will disturb at least two of the three lines this objection is not of great importance.

Discriminating Systems.

Merz-Price Balanced Voltage System (with and without Compensated Pilots).—The operation of this system depends on the maintenance of a balance between the current entering and leaving a feeder, balanced except for the capacity current of the cable. The balanced-current system, as described in a previous article entitled "Alternator Protection,"* is unsuitable for feeders owing to the length of the pilot wires and their consequent resistance.

The principle of balanced voltage protection is indicated by fig. 3, in which a single core of a feeder is shown. At each end of the feeder current transformers are installed, their secondary windings being connected through pilot wires in series with the relay coils. The connections are so arranged that the induced secondary voltages of the current transformers are in opposition. Under normal conditions the induced voltages are equal, and no current flows through the relay coils; the charging current of the cable can be compensated for by adopting a suitably high relay setting. The arrangement gives protection against faults to earth or between phases and is confined to the feeder itself, if suitable precautions are taken with the current transformers.

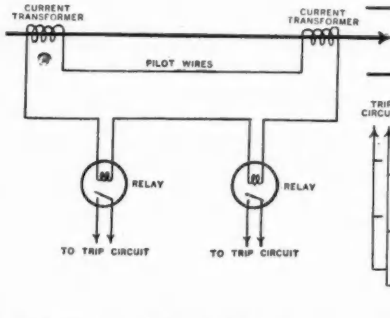


Fig. 3.—Merz-Price Feeder Protection.

The chief difficulty is in the initial balancing of the current transformers for voltage ratio over a wide range of primary current. With the balanced voltage system the current transformers used are virtually on open circuit, all the primary ampere-turns are magnetising, and the cores are consequently working at an abnormally high flux density. The higher the primary current the more will any out of balance become apparent. Should a heavy through-fault current flow, due to a fault on some remote part of the supply system, the current-transformer cores may become saturated, and, if the characteristics of both current transformers are not exactly similar, the trips may operate, just at the time when it is desirable to maintain the supply.

In order to remove this trouble and obtain a straight line characteristic several ingenious devices have been brought into use. The current transformers used are often provided with large adjustable air gaps in the cores, the idea being to make it practically impossible to saturate the cores, thus obtaining a straight line voltage characteristic. These transformers are subject to severe disadvantages in that, with the large air gaps used, they are susceptible to stray fields, and, if the cores are to be kept within reasonable dimensions, the output of such transformers must necessarily be small. In order to remedy the balancing difficulties biasing transformers are often used.

The biasing transformer consists of a three-limbed core on which are three windings, the functions of which will be discussed in the next instalment of this article.

Another disadvantage of the plain balanced-voltage system is that as the voltage across the secondary windings of the current transformers varies proportionally with the load on the feeder, the capacity current of the pilots may, unless precautions are taken, reach such proportions as to operate the relays. In order to compensate for this, the current transformers are sometimes given a slightly drooping characteristic, but, at the same time, the characteristics must be exactly the same in both cases.

The most satisfactory method is the compensated pilot system, in which the pilot wires are surrounded by insulated metallic sheaths. The sheaths are split at the middle of the feeder, each half being connected to the current transformer at its respective end of the feeder. These sheaths are shown in fig. 4; the pilot capacity current flows through the current transformers, the pilot core, and sheath, and has no effect on the relays.

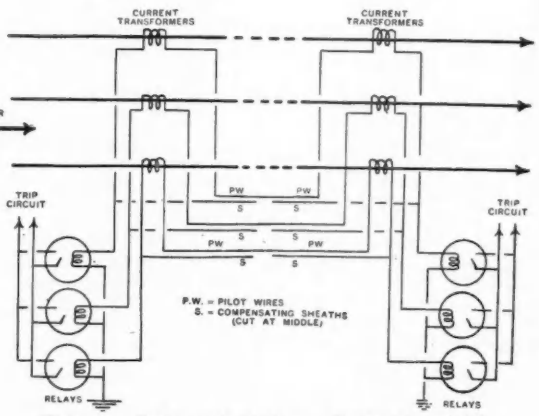


Fig. 4.—Balanced Voltage Protection with Compensated or Screened Pilots.

(To be concluded.)

* Electrical Review, September 6th, 1929.

Electricity for the Home.

Views on the present-day electric home which are more in accordance with those of housewives experienced in electric cooking than the opinions expressed by the author of "My Lady's Pleasure."*

By "ELECTRICOOK."

I HAVE been, for a long time, deeply interested in electrical appliances for the ordinary house, and when my husband brought home a recent copy of the ELECTRICAL REVIEW and showed me an article therein by "E.M.H.," giving a housewife's views on the subject, I read it with very considerable interest.

Much to my surprise, however, I found that the general tone of the argument was that, whilst all the various "gadgets" enumerated were highly desirable, at the present time they were unsatisfactory as a rule and needed much improvement before being widely adopted. It seems to me that an article of this nature is just what is *not* wanted, as from what I can gather from the discussions I have had with friends, the salesman of home electrical appliances has a hard enough time as it is to overcome prejudice and conservatism, and requires encouragement and not cold water. My own experience may therefore be of interest and assistance to others, as I have a very different tale to tell.

I think that "E.M.H." must have had either very little, or very unfortunate, experience of home electrical devices. For instance, her remarks *re* electric cookers simply amaze me; it is getting on for three years since I changed from gas to electric cooking, and I certainly have not the slightest desire to change back. My pies, pastries, and puddings are not lacking in "that tempting brown, flaky appearance"; on the contrary, they have a lovely golden-brown finish which I am quite sure could not be bettered by any other means of cooking. I agree that possibly the toaster may be a little slower than gas, but it *is* a little, and the toast is nicer and crisper. Further, a comparison of a gas-boiled kettle and one boiled on an electric plate shows that the former is quicker by, perhaps, three or four minutes; but is this really of *very* great importance? Personally, I think that to set off such a minor disadvantage against the manifold benefits of the electric cooker shows a very curious frame of mind!

Has "E.M.H." considered the perfect cleanliness of the electric cooker? The absence of fumes and smell, the ease of cleaning, the certainty of results (due to the uniform constant heat given by the definite switch positions), the enormous reduction in wastage of roasted meats; surely these benefits are sufficient compensation for an extra three minutes for a kettle to boil! Besides, if a small quantity of water is wanted quickly, what is the matter with an immersion heater? I have one which cost 10s. 6d., and it will boil half a pint of water in two minutes; as it is rated at half a kilowatt, this operation will consume one sixtieth of a kWh, if my (admittedly not very large) knowledge of electrical units is correct. This does not seem to me "very expensive and slow"!

When one also realises how much longer decorations last with electricity than with gas, it is hardly necessary to add any more. I have said nothing as to the cost of this method of cooking; this is where most people shake their heads sorrowfully and say that they cannot afford to cook by electricity. Well, naturally, the local prices of electricity and of gas will decide this point, but it may surprise "E.M.H." to hear that we used to pay just under 8½d. a therm for gas and now pay one penny per kWh for electricity for cooking, and my cooking costs a little *less* now than it did before! No, I find my cooker is a perfect treasure, and whereas "E.M.H." says "in every instance give me gas" my fervent prayer is that I shall never have to give up cooking by electricity.

As a final word on the subject of cookers, I (at the risk of becoming monotonous) must beg to differ entirely as regards the "long forethought required to use successfully the existing electric cooking apparatus." I was entertaining a visitor three days after my cooker was put in, and managed quite successfully, though naturally it took longer to learn the most economical use of it. Further, on a few occasions I have had to be away from home for some days, and quite a young maid has carried on in my absence.

When we come to electric refrigerators, I am (for a change) in hearty agreement with "E.M.H." It is a mystery to me why no firm has yet been sufficiently enterprising to put on the market a refrigerator at, say, from £20 to £30. This is an article which should sell in thousands, but how many people nowadays can afford to lay down £60, £80, or £100 for a means of preserving food? I think that the firm which has the courage to market a refrigerator at a really low price will reap a large reward.

Now we come to electric vacuum cleaners. "E.M.H." does seem to give these her blessing, but rather implies that their wide use is something to hope for in the future; why this particular "gadget" should not be almost universally used now is more than I can see. The person "rolling in money" can spend £15 or £20 on a cleaner, but this is not necessary. Mine cost about £9 over a year ago, and nowadays I believe quite good cleaners can be bought for £4 or £6, so that people of moderate means can afford to buy an article which is one of the greatest boons the housewife can have. The cost of running, even off a lighting circuit, is almost negligible.

The word of praise as to the electric iron is certainly fully justified. I do not think that the cord gets in the way enough to be taken into consideration.

Curiously enough, the article in question says nothing about an electric hot-water supply, except the remark as to an immersion heater. This is the one electrical contrivance about which I have a grievance, and that is on the grounds of running cost. After two years' use of a rather primitive device which we used only for hot baths, we recently had installed a modern hot-water tank, in the house system, and have found it quite successful, but rather expensive to run. It appears that the maker's estimate of one kWh per day heat loss only applied to the tank itself, and did not take into account the losses in the pipes connected to the tank. As a consequence the running costs, at a penny per kWh, are rather high, but, of course, in many places the charge for electricity for water heating is less than this, I believe, and the cost is therefore much lower. The abolition of making, stoking, and cleaning out the fire is a very great boon.

Except for a small heater fixed in the bathroom, and installed for use in very cold weather to prevent trouble with pipes freezing, an electric kettle, and, of course,

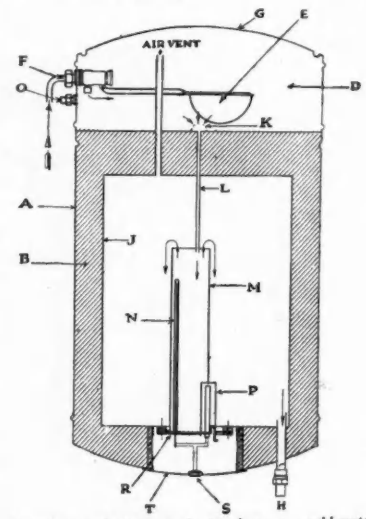
* ELECTRICAL REVIEW, September 19th, 1930.

electric light, this completes the list of my electrical appliances. With a cooker, water heater, immersion heater, kettle, iron, and vacuum cleaner, I think I may claim to have some grounds for speaking on the subject of the electric home.

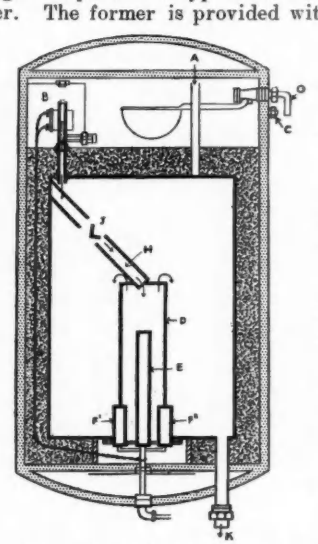
Fires we have not yet installed. Frankly, the cost of running these rather puts us off them, though their benefits are too obvious to need *any* championship. As regards electric washers, I cannot speak from experience, but from what I have seen and heard of these devices I should hardly think there is much risk of "tearing the clothes to pieces." Here again, the first cost seems very high. When is the really cheap washer coming? This seems to be a good field for the enterprising manufacturer.

Some of "E.M.H.'s" electrical aids seem to me to belong more to the realms of the "scientific" novel than to stern reality, but we move so fast in these days that the fantasy of to-day is often the commonplace of to-morrow; perhaps, before long, they will be on the market.

At any rate, there are enough aids to the housewife available at present to make her life very much easier, and I trust that "E.M.H." will endeavour to make good use of what she can get, and by spreading the gospel aid the electrical manufacturers and suppliers to obtain a much wider market for their goods, and thus help on the good work, rather than cry for the moon and damp the ardour of others who may be on the verge of "going in for" some or all of the electrical devices for the home which are now available.



A, outer casing; B, cork lagging; D, cold-water feed chamber; E, ball valve; F, cold-water inlet; G, removable lid; H, hot-water outlet; J, tinned-copper inner container; K, inlet to heating chamber; L, inlet pipe to heating chamber; M, protecting cylinder for elements; N, elements; O, overflow; P, bi-metallic thermostat; R, removable plate with element, thermostat, and protecting ring mounted thereon; S, connecting cable entry; T, removable cover.



A, air vent; B, automatic magnetic valve; C, cold-water entry; D, element-protecting cylinder; E, element; F_1, thermostat; F_2, thermostat; H, cold-water feed trough; J, section of trough; K, hot-water outlet; O, overflow.

Figs. 1 and 2.—"Inventum" Displacement-type and "Off-peak" Water Heaters.

Criticism of Electric Cooking.

It will be noticed that the writer of the above article expresses a view of electric cooking directly opposite to that held by the author of "My Lady's Pleasure," which was included in our issue of September 19th. Our "Correspondence" columns this week and last week contain letters in similar vein. With these more favourable views we find ourselves in general agreement, except on the question of the desirability of publishing opinions that appear to indicate that electric cooking has not invariably given satisfaction. This journal is read primarily by engineers and others having an inside knowledge of the electrical industry to whom knowledge of any adverse criticism from outside is important if progress is to be made.

Some interesting statistics regarding cookers are given in our "Correspondence" columns this week. These prove our correspondent's contention regarding the growing popularity of electric cooking; they also prove, in our opinion, that the cooker industry is too well established to need to fear an occasional cold draught of criticism.

The only reasons we can suggest for any failure to appreciate the merits of electric cooking are the use of obsolete apparatus or the difficulty which some people have in adapting themselves to methods, which, even if simpler than the old, are different. It is of no use our shutting our eyes to the fact that people of goodwill and intelligence do exist who have this weakness. Some undertakings wisely provide for it by offering the services of a demonstrator to explain to the housewife how to make the most of a hired cooker. In our own experience this has most effectively met the needs of the case. Another moral to be drawn is the immense field of activity there is for the E.A.W. in educational work, particularly in making the youth electrically-minded.

"Electricook," in her article this week, is not so favourably disposed towards room heating and water heating, but on economic grounds only. It should be noted that the charge is 1d. per kWh, whereas reference to the table published by us on April 11th last will show that a large number of undertakings make a secondary charge not exceeding half that figure.—Eds. Elec. Rev.

New Water Heaters.

"Inventum" water heaters recently introduced by Mr. Alan Wright, 117, Victoria Street, S.W.1, include a 1½-gal. displacement-type heater and the "Off-Peak" heater. The former is provided with chromium-plated fittings and a swinging outlet spout. The unique feature in this heater is the patent "non-drip" device. For above 1½-gallons capacity a different system is employed, *i.e.*, gravity feed, with a ball-valve-controlled cold-water inlet, a restricted inlet of cold feed water into the heating chamber, and an outlet at the bottom. This arrangement is shown in fig. 1. The advantages claimed for this type of heater are: it is approved by all the leading water supply authorities and can be connected direct to high-pressure water mains, thus saving plumbing costs; it makes the phrase "constant hot water" a reality as, due to restricted cold-water entry, the water in the heating chamber, even immediately after the cistern has been emptied, is always hot, though the quantity may be small. Fig. 2 shows the construction of the patent "Inventum Off-peak" water heater, in which an automatic magnetic valve cuts off the cold-water feed when the current is switched off by a time-switch or other means, thus preventing cooling of the water in the storage chamber as water is drawn.

A Portable Electric Cooker.

The "Everhot" portable electric cooker, a recent production of Everhot Electric Co., Ltd., 9-15, Oxford Street, London, W.1, is an appliance of the type in which food is cooked with little or no water. It consists substantially of a double-jacketed, upright, cylindrical vessel packed with heat-insulating material between its outer and inner walls, and provided with a removable insulated top lid or cover and a bail-type of lifting handle fitted with a black-enamelled wooden hand grip. The cooker provides for high or low temperature, and is connected by a plug with a length of flexible cord to either lamp socket or wall plug as required. The apparatus is supplied with a wire stand, three aluminium cooking pans, one of which has a removable lid held in place by wire clips; the total capacity of the pans is six pints. The main dimensions of the cooker are: interior, 7¼ in. diameter by 9 in. deep; exterior, 10 in. diameter by 13¼ in. high. The loadings are: high, 450 watts; and low, 100 watts.

National Radio Exhibition.—II.*

A review of the 1930 Olympia Show from the point of view of technical progress and recent tendencies.

By P. K. TURNER, M.I.E.E.

FROM many points of view, probably the most important, "Radiolympia, 1930" has been a rousing success. But to the technician looking for novelties or real improvements it was, on the whole, a disappointment.

There were some bright spots, especially in the first matter to be considered: the "general idea" behind the design and lay-out of sets exhibited. It seems to be quite definite that the typical moderate-priced set on offer is no longer the portable, but the mains-driven 3-valve set.

It is doubtful whether the industry really realises what an important point this is: how bad a thing for the trade the portable has been. It is a set in which enormous sacrifices have been made for one particular object —portability combined with a rather long reception range. Yet, in 90 per cent. of its working life, this object is quite unimportant, for in actual practice the portable is used at home ten times as much as out of doors, at picnics, and so forth. In order to make its occasional outdoor use possible, it uses a small dry battery. Thus its musical performance is inevitably poor and yet is obtained at inordinate upkeep cost, for small dry batteries cost more *per year* than any other form of supply. In order to get portability, it uses a frame aerial and therefore calls for an amount of h.f. amplification costing about three times as much as an aerial; and to keep its weight down the components must be scamped, which leads to poor musical quality, even at the whispering strength which is all that the small battery allows without distortion.

Even if (as will be seen below) the new "mains 3" sets are not quite what they might be, they are better than portables.

Short-range Sets.

Another notable point about new sets is the introduction of several small sets (2-valve) of reasonable musical quality, designed for receiving the two alternative programmes from the nearest stations, and in one or two cases by switching after having "tuned-in" once and for all. Such sets, at moderate prices, are a real advance from the users' point of view, though without technical novelty.

Among luxury sets, one noticed little change, except a natural increase in combined radio-gramophones. The technics of such sets do not seem to have been greatly improved.

There was on view one set of apparatus for home recording. It was quite low-priced, and there would seem to be some scope for similar apparatus on rather more advanced lines.

H.F. Design.

Considering the show now in more detail, let us first turn to radio-frequency design. Here (as is perhaps natural) the material exhibited was not up to latest knowledge. For example, there appeared to be only one firm using the twin-coupled circuits (for getting a "square-topped" resonance curve) which are the standard procedure for all sets described in the technical Press. There was no sample of any of the super-selective circuits of the radically new type which have been much discussed lately.

Screening and arrangements for single control have much improved, but in many cases the provision for control of volume at the beginning of the set is inadequate. Perhaps it is not realised that this is highly important; but overloads on a high-power r.f. amplifier can cause the most curious and unpleasant results, and such overloads are extremely likely with the new regional stations functioning.

Detection.

As regards detection, again progress is slow. The semi-technical Press has this year at last awakened to the fact that grid rectification can be made to give less distortion than anode rectification, as well as being more sensitive (a thing which some of us knew three years ago). But some manufacturers are still proudly advertising "anode bend" as a merit of their sets, and many who are using grid rectification are doing so in the old bad ways.

This is a matter which needs attention; for the distortion introduced by the rectifier increases with the depth of modulation at the transmitter, and the British Broadcasting Corporaion is merciless in this respect. It has learned how to modulate deeply without distortion at its end and, as the apparent power of its stations varies directly with the modulation, it uses its knowledge. In the past, poor detectors did not show up very much, but they do now, and it is time that more care was taken in this respect.

The Audio-frequency End.

One had thought that the design of audio-frequency amplifiers had become almost an exact science, but this belief received a rude shock. On the whole, the l.f. part of moderate-priced sets showed a distinct retrogression in design. This was mainly due to the free use of pentode valves.

The pentode is a most interesting valve, and it is extremely useful under certain conditions and in the right place. But it is decidedly *not* in the right place as the last valve in a moderate-priced set to be sold for use with an ordinary moving-iron loud-speaker.

This is hardly the place to go into the matter fully, but it can be shown that the pentode never gives practically negligible undistorted power output *unless* it is used under "constant-current" conditions, *i.e.*, with a load whose impedance is very low compared with its own. But moving-iron loud-speakers have an impedance which rises rapidly with frequency, and, moreover, usually need "constant-*voltage*" conditions to give reasonable bass response; so they are totally unsuited for operation with pentode valves. Therefore, the one particularly wrong use of a pentode is in a set of moderate price from which it is hoped to get fair to good results with a moving-iron speaker.

It has a field in a very cheap set, or any other, such as a portable, which is to be used with very low anode voltage, more or less regardless of distortion; for, unlike the triode, its impedance *falls* under such conditions, but that is another matter.

It also has a restricted field in sets specifically arranged for use with a moving-coil speaker designed for constant-current operation; but it must be realised that under such conditions its high magnification is apparent only; it will have about the same *effective* μ as a modern power triode, and usually a much smaller power output for the same filament wattage. Also its

* For Part I see Elec. Rev., September 26th, 1930, p. 498.

power efficiency, defined as watts into the loud-speaker as a fraction of the high-voltage watts supplied, is low compared with that of a triode.

In view of the large proportion of sets exhibited for mains operation, the usual amount of output power provided was disappointing. It is understandable that a set for battery operation should be strictly limited in current consumption; but with mains supply the cost of increasing the supply to the last valve from, say, 20 mA at 200 V (4 W) to perhaps 40 mA at 250 V (10 W) is not very great, while the difference in performance is surprising. Even in the case of large and costly sets it seemed to be assumed that 5 W was enough for the last stage, whereas in actual fact 20 W is desirable and 10 W a minimum to which one may be driven by considerations of cost.

It seems probable that this limitation of power in the case of expensive sets is not in most cases one of cost, but simply results from failure on the designer's part to appreciate what first-class reproduction should be.

The smaller sets showed up better in this respect, many of them using 5-W valves, which is reasonable in respect of a moderate-priced set for a popular market.

Constructional Design and Finish.

As regards the carrying-out of the design, construction, controls, cabinets, arrangement, and so forth, there has been undoubted progress. The appearance of many of the cheaper sets is quite surprisingly good; it is easy to put an expensive set into a good, but expensive, cabinet; but *not* easy to get a nice-looking and well-finished cabinet for the amount allowable for that purpose in a cheap set.

Control arrangements have been simplified, though there is not enough money about to lead to the standardisation of "one control" (which puts about £20 on to the selling price of a set). It is good to see that calibration of the controls in wave-lengths is steadily extending, though it might be wiser to calibrate in frequencies, so as to make the inevitable change-over easier. After all, the B.B.C. gives the frequencies every time it prints the wave-lengths.

Sets designed to give two or three stations by switching instead of tuning were present, but in a minority. Even among the expensive sets there were none offering the full remote control now existing in some American sets, where many stations can be switched, as well as the volume controlled, from a distance. Perhaps the British public is too sensible to pay the extra cost of this.

Automatic volume control (anti-fading) is another American luxury which was absent.

The general standard of protection and safety of mains-driven sets really showed progress of a pleasing kind. There were many cases in which the I.E.E. Regulations were not fully enforced, but even in these there were reasonable attempts at safety.

Design for maximum economy in production is still behindhand, except in a few outstanding cases. Perhaps the quantities made are not large enough to permit of elaborate tooling; but anyhow, the fact remains that the average set contains too many screws, too much wire, too many soldered joints, and not enough components specially designed and made for it.

Valve Progress.

Among the components, valves naturally take first place. Progress here continues. Mutual conductivities steadily increase, there is greater variety, and prices have come down. No type or maker calls for especial remark—all have shared in the general improvement. It is notable that in the assortment of valves on the market for fulfilling the various requirements of set design we are two or three years ahead of America.

The metal rectifier also has progressed, especially in types designed for small currents at high voltages (*e.g.*, for anode supply). Whereas previously it was an expensive substitute for valves, deserving consideration on the grounds of easy smoothing and long life, it now competes on price also.

Loud-speakers.

Loud-speakers were puzzling. The moving-iron cones showed good progress. Apart from the "inductor" type from America, now being made under licence, many of the better-class "balanced-armature" speakers were surprisingly good. But the moving-coil speakers were disappointing. True, only the best of the moving-iron speakers could compare at all with the moving-coils; but there should not have been even this approach.

The fundamental physical law behind the moving-coil loud-speaker is right, while the moving-iron speaker is from first to last a fight against the limitations of an unkind law. For the latter to approach the former in performance is an indictment of moving-coil design.

The reasons were in most cases clear on an examination of the moving-coil speakers, which showed quite unnecessary faults in design. There is scope here for much improvement.

Permanent magnets of satisfactory design for m.-c. speakers seem to have arrived. This reflects credit on the magnet-makers, but, of course, does not affect the performance of the speakers, however much it may improve their popularity.

So ends the show of 1930. As we said at the beginning of this short review: great popular interest; progress from the user's point of view; but little in the way of technical novelty.

Notes on Manufacturers' Displays.

The **Edison Swan Electric Co., Ltd.**, exhibited a range of some 30 "Mazda" valves, amongst which was the latest a.c. pentode; battery- and mains-operated receivers, a mains-driven transportable set; horn, balanced-armature cone, and R.K. moving-coil speakers; head-phones, battery eliminators and chargers, and a selection of radio and gramophone components. Also included were power-amplifying equipment of British manufacture and a B.T.H. sound-reproducing projector for talking-picture theatres. Entirely British in design and manufacture, the senior model is suitable for halls of a seating capacity of 2,000; the equipment includes two projector stands (sound on film, and film and disk), 40-watt dual mains-operated amplifier, motor-generator set and rotary convertor, eight R.K. moving-coil loud-speakers with baffles and necessary supports, change-over and fader switch for projectors, and monitor loud-speaker. Junior models suitable for smaller halls with seating capacities of approximately 800 comprise two projector stands and one 10-watt mains-operated amplifier, &c., while type E equipment is similar, except that two 10-watt amplifiers are used in parallel, giving an output of 20 watts suitable for halls having a seating capacity of approximately 1,100.

The **Varley (Oliver Pell Control, Ltd.)** display of receivers and components included a transportable set so designed as to be driven by d.c., but easily convertible for a.c. mains operation. The company's a.c. all-electric radio-gramophone is built in the console form, in a walnut cabinet worthy of the instrument it contains. It may be used in conjunction with an ordinary open outside aerial, or with its self-contained aerial; modern a.c. valves and circuit arrangements are employed, and the output stage consists of two ten-watt valves in parallel, which adequate volume is conveniently controlled. The instrument is fitted with a Baker moving-coil speaker of the type which was chosen for trade exhibitions of talking films at the London Hippodrome. For electrical gramophone reproduction the equipment consists of a Garrard motor fitted with a pick-up and automatic arm, ensuring correct tracking of the records and providing an automatic stop. When not in use no loud-speaker fret is visible; the doors have been arranged to hinge back to the front side panels when open, thus avoiding any awkward projections without detracting from the appearance of the cabinet when closed.

The **British General Manufacturing Co., Ltd.**, besides a variety of chokes, transformers, and tuners that dispense with

wave-traps, showed bakelite mouldings of intricate shapes neatly made.

Messrs. S. G. Brown, Ltd., exhibited new designs of receivers for battery and a.c. and d.c. mains operation, including a new "portable" set; also a range of speakers in cabinet and chassis models, moving-coil units of the a.c., d.c., and permanent-magnet types; and electrical reproducers.

The **Ever-Ready Co. (Great Britain), Ltd.,** is well known as a maker of batteries of all kinds. Its display of dry primary cells and accumulators in glass, celluloid, and ebonite cases (the two last-mentioned classes including unspillable types) provided a wide selection for grid-bias, filament, and anode circuits. The glass cells do not contain separators, so that the whole plate surface is in contact with the acid; they are provided with spring steel carriers and rubber insertion handles. The cases and cell partitions of another type are made of solid ebonite moulded in one piece; an iron handle is fitted, and they are made for heavy duty similar to motor-car sets.

The **London Electric Wire Co. & Smiths, Ltd.,** whose trade name of "Lewcos" is synonymous with coils, keeps pace with circuit developments. For instance, the use of screen-grid valves stimulated the production of h.f. transformers with interchangeable primaries in place of the less selective tuned-anode coil with reaction; again, fieldless astatically-wound "binocular" coils were specially designed to reduce inter-coil field action and feed-back and avoid over elaborate screening. The bugbear of coil changing is eliminated by suitable switching arrangements, while dual-range coils and twin six-pin bases have been conceived to avoid the pitfalls of unwanted capacity produced by bunched wires on the h.f. side of the receiver. The dual-coil unit consists of an aerial coil and a transformer of the dual-range type; both are of the binocular or astatic type, mounted together on a common moulded base with an encircling metal screen provided with a metal dividing fillet between the two pairs of coils. The aerial coil has a tapped winding for the 235/550 m. waveband, and an aperiodic winding for the 1,000/2,000 m. waveband. The transformer has been designed to operate with any screen-grid type of valve, and is provided with primary, secondary, and magnetic reaction windings. The turns ratio between the primary and secondary windings has been very carefully proportioned for good amplification consistent with selectivity. The switchgear is of a simple and robust nature, so arranged that it can be operated from either end of the unit, and is readily accessible for inspection by removing the top moulding, which is secured to the metal screen.

When h.f. stages are employed some kind of metal screening is essential, and for several years "Lewcos" screened coils have been available, from the six-pin type to the present dual-range screened coils. Last season the company definitely entered the l.f. side with the introduction of low-frequency transformers, and this season witnesses a further inroad, as there is now available a smaller-ratio transformer and l.f. choke. There are now on the market several alternative "Lewcos" kits of parts ready for assembly with complete constructive information.

Siemens Brothers & Co., Ltd., need no introduction as dry battery makers. The selection of an anode battery is undoubtedly influenced, in a very large number of cases, by the question of cost. Nothing is more natural than the temptation to spare the pocket and purchase a cheap battery which will "just about do the job"—for a time. In the "Full O'Power" range there are three general types, *viz.*, the "Popular" at popular prices, the "Power" at less than double the cost of the popular type, but giving approximately three times the service, and the "Super Radio" type designed to meet the exacting demands of pentode valves. A new pattern introduced particularly for portable sets is the "Special," designed to give maximum life and power within the comparatively small dimensions permitted by the limited space in portable receivers. Features of these dry cells are greater capacity than usual, the use of seamless drawn-zinc cylinders, and improved methods of construction by the application of automatic machinery. Glass-cell filament accumulators were also on view, besides radio testing instruments and varied samples of ebonite insulated parts. The moving-coil combined volt- and milliamperemeter with six ranges, *viz.*, 3, 15 and 150 volts, 7.5, 75 and 750 milliamperes, suitable for testing filament and anode batteries and for measuring the filament current (up to 0.75 amp.) and the plate current of valve receiving sets, is of a simple form, with only two terminals for connecting purposes, a removable selector plug determining the range in use. Used as a voltmeter, this instrument has a resistance of approximately 150 ohms per volt and its overall dimensions are small.

The **Sun Electrical Co., Ltd.,** as a wholesale distributor, confined its display chiefly to a selection of this season's models of receivers of all types produced by the leading manufacturers for the attention of the trade.

The **Automatic Coil Winder & Electrical Equipment Co., Ltd.,** as its name implies, exhibited "Macadie" and "Douglas" hand-operated and power-driven machines for winding coils, with attachments for the insertion of insulating paper between each layer of wire, or at any intervals desired. The self-contained "Avonmeter" reads amperes, volts, and ohms directly without the addition of external shunts or multipliers.

Benjamin Electric, Ltd., had a display of well-made valve-holders, different types of switches, &c., and a ball-bearing turn-table with folding legs.

The **Brownie Wireless Co. of Great Britain, Ltd.,** was one of the very few firms which still showed crystal receivers, besides, of course, screen-grid valve mains- and battery-operated sets, loud-speakers, and such components as slow-motion tuning dials, transformers, wave-traps, &c., and bakelite mouldings.

Thos. De la Rue & Co., Ltd., exhibited "Telenduron" mouldings in bakelite, plastic, fireproof, and acid-resisting materials, coloured and black, demonstrating completely assembled products with metal work and fittings moulded in position, produced with the aid of single and multiple steel dies; the plant capacity is from 0.25 in. to 3 ft. 6 in.

The **Telegraph Condenser Co., Ltd.,** showed a variety of electrolytic, mica, and paper "T.C.C." condensers for radio reception and transmission purposes; high-frequency and high-voltage smoothing condensers tested up to 80,000 volts d.c., while special types made for receiver manufacturers include subdivided block condensers of multiple capacities and midget mica types, whilst the power-factor correcting equipment of the company should be of interest to electrical engineers in general.

Bakelite, Ltd., had a stand on which were synthetic resin products, moulding materials, laminated sheet, tubes, and rods; impregnating varnishes, lamp-capping cement, lacquers, transparent bakelite materials, and samples of articles made of the above-mentioned materials for customers.

The **British Ebonite Co., Ltd.,** had a display of "Becolate" grained panels, rods, tubes, sheets, and mouldings; choke formers in a range of sizes and varieties included an improved pinless contact former.

The **Concordia Electric Wire Co., Ltd.,** showed silk, cotton, and enamel insulated copper and resistance wires, rubber- and lead-covered cables, flexible cords, multi-core connecting leads, outdoor and frame aerials, &c.

The **Fuller Accumulator Co. (1926), Ltd.,** exhibited "Sparta" anode and filament accumulators, dry cells, unspillable batteries and others with triangular or segmental blocks instead of plates; "Balkite" trickle chargers were also to be seen on the stand.

Pertrix, Ltd., had a stand on which a variety of sizes of dry batteries and accumulators was exhibited. The former are made by a process which dispenses entirely with the use of salammoniac, while the latter are made up of glass cells, and are fitted with a new form of carrier.

The E.P.E.A. Dinner.

Southern Division.

THE official title of what has come to be generally known as "the E.P.E.A. Dinner" is the Southern Division Annual Dinner to the National Executive Council. This year's function, the twelfth of an unbroken series and, incidentally, the ninth in succession organised by Mr. P. Gordon Hieatt (honorary secretary of the Division) was held in the King's Hall, Holborn Restaurant, London. The acoustic properties of this hall did not appear to be so good as those of the rooms at the now defunct Hotel Cecil, where earlier dinners were given, and some members regretted the removal of the wires that at one time were strung across from wall to wall to break the echo with results that were said to be satisfactory. The new venue proved quite capable of accommodating comfortably the 425 members and visitors, but the number was not so large as last year (480), no doubt due to the date's being three weeks earlier.

The lack of a really suitable large hall in the centre of London is thus brought to the fore early in the winter season. The problem is likely to prove difficult in the case of some of the gatherings of engineers, which have a tendency to become larger every year.

After the honouring of the loyal toast given by Mr. T. R. EDGE (chairman, Southern Division), the toast of the "Association, coupled with the name of Mr. A. V. Sendall, president," was proposed by the Rt. Hon. J. R. CLYNES, P.C., M.P. (Home Secretary), who referred to the progress of engineering as a building from mind to mind and from generation to generation, and pointed out that the astounding discoveries of our grandfathers had become the accepted things of to-day. The Shannon scheme was, he considered, one of the finest—if not the finest—work of its kind in Europe.

The great requisite for engineers as for others was a proper and healthy pride in their work; this could not be covered by questions of salaries received, and the greatest thinkers and workers had never received the rewards offered to the comedian or film star. Payments for past war and for defence were what prevented reduction in taxation; the actual cost of governing a country was quite small. The two greatest professions he believed to be those of engineering and medicine, which gave 100 per cent. service. There was no greater delusion than that the less a man did the more work could be found for other men.

Mr. A. V. SENDALL, in response, drew attention to the growth in prosperity of the industry parallel with the growth

of the Association. This might not, be cause and effect, but it could be claimed that this progress had been caused by the increased efficiency and sheer hard work of the staffs. The success of the Whitley Councils in the electricity supply industry was a credit to employers as well as employés. The industry suffered from a lack of window dressing, and he suggested the formation of an Electricity Marketing Board as soon as the national scheme was in full operation. Cheap and reliable apparatus was necessary as well as cheap electricity, and the co-operation between manufacturing and supply engineers in the technical groups of the Association enabled each branch of the electrical industry to understand the needs of the other.

The chairman briefly welcomed the guests, and Mr. A. E. Ricketts (senior vice-president) then presented to Mr. T. D. Martin (immediate past-president) tokens of esteem from the members of the Association and mementos of his year of office. These took the form of a gold watch and book-case, and also, for Mrs. Martin, an aluminium rectangular wrist-watch. Reference was made to the presence of Mr. T. D. Martin, Junr., who had recently begun his career as an electrical engineer.

Mr. T. D. Martin expressed his thanks and appreciation of the feeling prompting these gifts.

The chairman proposed the annual vote of thanks to the honorary divisional secretary for his work in organising the dinner, to which Mr. P. G. Hieatt responded in his usual brief and modest manner.

During the dinner a programme of instrumental music was rendered, and between the speeches and on their termination vocal and other items, all of which maintained the customary high standard.

Warsaw's Broadcast Transmitter.

Marconi 160-kW plant, the most powerful installation on the European Continent, is undergoing tests at Chelmsford prior to being shipped to Poland for erection at Rasin.

THE long-wave radio-telephone broadcasting station which is to be erected within the next few months near Warsaw for the Polish Broadcasting Co. will be the most powerful installation of its kind on the Continent of Europe, probably having the highest rating that the International Broadcasting Union is ever likely to sanction.

This installation, which is being supplied by Marconi's Wireless Telegraph Co., Ltd., is now undergoing its final tests at the company's works at Chelmsford, where it was manufactured, before dispatch to Poland, where it will be erected at Rasin, about 20 kilometres from Warsaw.

The 160-kW power of the new Warsaw station can be appreciated from a comparison with that of the English station at Daventry 5XX, which has an aerial power of 25 kW, and with that of the Swedish station at Motala, which delivers 30 kW to the aerial.

The aerial at Rasin will be of the half-wave type, terminating in a feeder house underneath the aerial. Feeder lines from the transmitting hall to the feeder house will convey the energy to the aerial, which will be carried on two masts 600 ft. high and 750 ft. apart. They will be the highest masts in use at any of the European broadcasting stations. The new station will operate on the 1,411-metre wavelength.

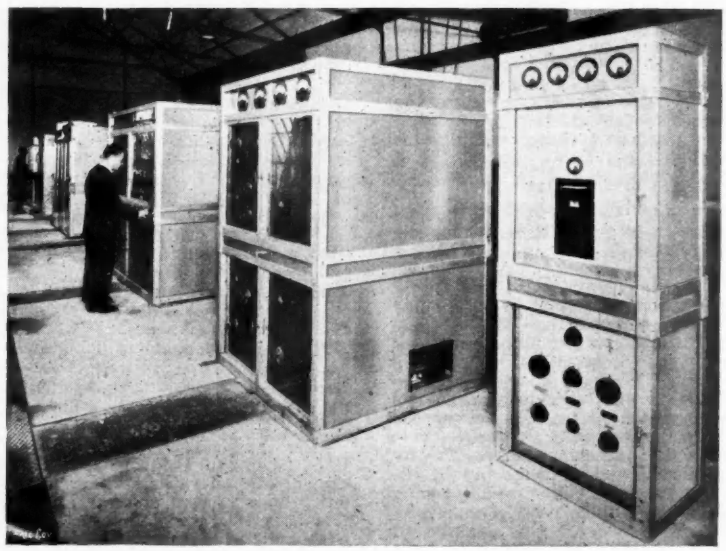


Fig. 1.—160-kW Radio Transmitter on Test at Chelmsford.

The various parts of the transmitter are contained in aluminium and glass panels, completely screened from one another to prevent interaction, of somewhat similar appearance and general arrangement to the B.B.C. plant at Brookman's Park. The accompanying illustration (fig. 1) shows the panels as we inspected them at Chelmsford last week. The usual low-power modulation and push-pull amplification have been adopted, the glass valves having water-cooled copper anodes and also water-cooled filament leading-in joints. Automatic temperature-increase alarm devices have been provided; the panel doors are interlocked with the main switch to prevent access to the high-voltage gear while it is energised; and spare valves can be semi-automatically switched into service in the event of failure.

In the main, or last-stage, magnifier eight valves, each rated at 100 kW (that is, 50 kW loss in each anode) will deliver the modulated energy to the aerial, which, at 80 per cent. modulation, will amount to some 160 kW according to the latest method of rating such plant; normally, six such valves will be used. The total primary energy required to operate the whole of the equipment amounts to 700 kW, which fact indicates the cost of the power requirements for thoroughly testing such plant.

The modulation has a straight-line characteristic throughout the frequency band of 30 to 10,000 cycles, and should accordingly result in high-quality output. A valve drive, with provision for the use of tuning-fork or crystal control if desired, of absolute precision is provided in order to ensure that the station will remain accurately on its allotted wavelength and to prevent it from interfering with other transmissions on neighbouring wavelengths.

For driving the station the three-phase power supply will be rectified by a Brown-Boveri mercury-arc rectifier of 550 kW capacity, delivering rectified current at from 8,000 to 16,000 volts. The rectifying equipment is to be duplicated, so that more than 1,000 kW of rectified a.c. will be available.

Special land-line gear of the latest type has been manufactured to link the studios, which will be situated in Warsaw, with the transmitter. High-class land-line apparatus for simultaneously operating the high-power station at Warsaw and the other broadcasting stations at Lwow and Wilno is also being provided.

A comparison with the original transmitter that was used on the top floor of Marconi House to inaugurate the official service of the British Broadcasting Corporation on November 14th, 1922, which was exhibited at the Radio-Exhibition at Olympia last week, illustrates the immense strides made in broadcast transmitting technique during the last eight years, for the new installation is about 150 times as powerful as the first 2LO plant, which delivered not more than 700 watts to aerial.

The manner in which the Marconi Co. is maintaining British prestige in the radio industry will be appreciated from the statement that radio-telephone broadcasting installations manufactured by it and its affiliated companies are in service in the following twenty-five countries:—

Australia, Austria, Belgium, Brazil, Canada, China, Czecho-Slovakia, Finland, Great Britain, Iceland, India, Irish Free State, Italy, Japan, Jugo-Slavia, Norway, Peru, Poland, Korea, Rumania, Russia, South Africa, Spain, Sweden, and Switzerland.

Business and Industrial Notes.

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures.

Australian Post Office Contracts.

The *Sydney Morning Herald* reports that the Commonwealth Postmaster-General (Mr. Lyons) recently prepared a statement regarding the contracts awarded by the Post Office to overseas firms since Mr. H. P. Brown became Director of Postal Services. This showed that since January 1st, 1924, 1,125 contracts had been let to overseas firms, the total value being £4,571,919. Contracts in the cases where there was no Australian competition represented a value of £3,957,847, and where there was Australian competition, £614,072. In addition, supplies were obtained under State Government contracts, Commonwealth stores supply, and Tender Board contracts, where there was no Australian competition, to the value of £794,581, and where there was Australian competition to the value of £25,703. Total supplies from overseas were valued at £5,392,203, while supplies of Australian manufacture were valued at £6,624,542. Mr. Lyons said that it might be assumed from the figures that in the cases where there was Australian competition, the orders went overseas either because of the excessive price of the Australian article or because of its unsuitability for Post Office requirements.

Trade Visits to India.

In the course of a recent letter, the Comptroller-General of the Department of Overseas Trade says that as the usual time for business visits to India is approaching, he desires to draw attention to the facilities which the Trade Commissioner Service can afford to representatives of British firms visiting India. Mr. T. M. Ainscough, C.B.E., the Senior Trade Commissioner in India and Ceylon, has again intimated that he and his colleague, Mr. W. D. M. Clarke, Trade Commissioner at Bombay, are particularly desirous of meeting visitors from the United Kingdom, as they feel that with their organisation they are in an excellent position to render assistance, either to principals undertaking a special mission of investigation, or to commercial representatives who are developing the sale of British-made goods in India. The Department will be pleased to provide trade visitors with letters of introduction to the Commissioners in question. In addition, an officer of the Department in London will be pleased to discuss proposed trips with a view to rendering assistance not only as regards market conditions obtaining in India at the present time, but also, if desired, concerning the itinerary, outfit, &c.

New Surbiton Showrooms.

New electrical showrooms for Surbiton Electricity Supply were formally inaugurated at 22, Claremont Road, Surbiton, on September 30th by the chairman of the Urban District Council. We intend to refer more fully to the new showrooms in our next issue.

Electrical Regulations at Cardiff.

In its 1930 Act the Cardiff Corporation obtained powers to impose regulations with regard to the supply of electricity to consumers' premises in its area. Last week the Electricity Committee decided that the adoption of by-laws should be deferred pending the drafting of model by-laws by a central authority for the approval of the Electricity Commissioners.

Glasgow Housing and Health Exhibition.

The tenth annual housing and health exhibition promoted by Glasgow Corporation was opened in the Kelvin Hall on September 24th. The Corporation Electricity Department has a well-arranged stand which is attracting much attention. A modern kitchen shows the latest developments in electric cookers, while in the bathroom are installed electric water heaters for the bath and wash-hand basin, towel rails, and rejuvenators. There are also shown electric fires, clothes-washing machines, and electric ironers. Among other electrical exhibitors are Electrolux, Ltd., which is displaying vacuum cleaners, refrigerators, water softeners, and floor polishers; the Edison Swan Electric Co., Ltd., which makes a feature of the combined "Thor" electric washer, wringer, and ironer, while the company also exhibits vacuum cleaners, electric dusters, and electric exercisers; Malcolm Cree & Co., who are showing "Fenbo" glareless crystal lamps; the Sheringham Daylight Co. (1930), Ltd., exhibiting "Daylight" lamps, including a special range of reading lamps; the Stokes Table Cooker Co. (electric cookers); the British Horo-Electric, Ltd. (Bulle clock); Singer Sewing Machine Co., Ltd. (electric sewing machines); Hoover Ltd. (vacuum cleaners); Tellus Electric Cleaner Co. (Scotland), Ltd. (vacuum cleaners); Carron Company (electric cookers, irons, &c.); Pearsons Stores, Ltd. (electrical fittings, &c.); British Vacuum Cleaner and Engineering Co., Ltd. (vacuum cleaners); Ideal Home Electrical Appliances, Ltd. (portable violet-ray high-frequency vitalators, vacuum cleaners, &c.); Eureka Vacuum Cleaner Co., Ltd. (vacuum cleaners); and the British Electrical Development Association, Inc. (demonstration shop window showing the principles of efficient lighting, and an illuminated diagram of "The House You Want").

Electrical Manufacturing in Australia.

Reuter (Sydney) reports that the most important single industrial development which has taken place in Australia since the Amalgamation of Anglo-Australian iron and steel interests in 1928, was announced last week, when it was stated that the Australian General Electric Co., Ltd., Ferguson, Pailin, Ltd., and Metropolitan-Vickers (Australia) Proprietary, Ltd., had combined for manufacturing purposes in Australia with a capital of £800,000. Each company is to retain its separate identity, its own brands, and its own sales organisations.

Mr. G. J. Hargreaves, O.B.E., local secretary of the Vita Storage Battery Co., of San Francisco, is to organise the erection of a factory at Perth, Western Australia, for the production of the company's products. It is also announced that Mr. C. E. Forrest, managing director in Sydney for the International Radio Corporation, has just returned from a trip to America, and states that his company, in view of the Australian tariff, has decided to erect a factory at Sydney.

Among the companies recently registered in Sydney, N.S.W., are the following:—Exide Batteries of Australia, Ltd., capital £200,000; and Associated Battery Makers of Australia, Ltd., capital, £250,000.

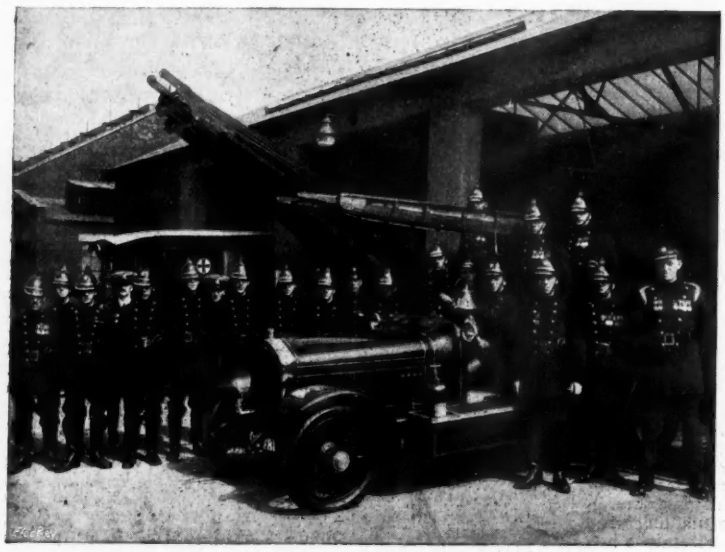
Legal.

The Rating of a Company's Scottish Premises.—The appeal of Electric Control, Ltd., for a reduction of the valuation on premises at 177, Reid Street, Glasgow, came before the Glasgow Burgh Valuation Appeal Court on September 25th. It was stated for the appellants that because of trade depression they had concentrated their manufacturing business in England. They did not now occupy the establishment in Reid Street although holding the premises under lease and paying a yearly rent of £880. It was contended that the appellants should get the same de-rating benefits as they were given last year. The City Assessor said the appellants could not claim de-rating in Glasgow when they were not carrying on manufacturing in the city. They would be getting the benefits of de-rating in England. The appeal was refused.

Breach of Factory Acts Charge. — The *Manchester Guardian* reports that for a breach of the Factory Acts by failing to properly insulate an electric lampholder, as a result of which a 15-year-old boy was fatally injured, British Bemberg, Ltd., which is building a factory at Doncaster for the manufacture of artificial silk, was fined £5 at Doncaster on September 29th. For the defence it was stated that though there were two defences which they might plead, and might have thrown the responsibility on to an employé, the company desired to take full responsibility. An employé took a certain lampholder from a bin of miscellaneous articles instead of another place, and he thereby took the one defective holder on the premises.

The Metropolitan-Vickers Fire Brigade.

During last winter the whole of the members of the works fire brigade of the Metropolitan-Vickers Electrical Co., Ltd., received a course of instruction in first aid under the auspices of the British Red Cross Society, and in the subsequent examination they all passed, and were granted the Society's certificate and arm badge. These certificates, together with one or two other awards, were recently presented by Mr. G. E. Bailey (director), supported by several members of the management and Mr. S. Ratcliffe, chairman of the Works Committee. After Mr. Bailey had inspected the parade of officers and men and the fire station equipment, Mr. H. W. Brighten thanked him on behalf of the Brigade for the new fire station building and motor-driven fire tender. After presenting the certificates, Mr. Bailey addressed the officers and men, and expressed his appreciation of the work of the Brigade, and congratulated them upon their recent successes. Chief Officer Burke thanked Mr. Bailey for his attendance and Mr. S. Ratcliffe expressed the appreciation of the Works Committee, and employés generally, to the company and to the Brigade for the very useful service which they rendered from time to time.



The Metro-Vick Fire Brigade and Equipment.

U.S. Enterprise in South America.

In the course of an interview with the representative of an Oslo newspaper, Mr. Sontum, a Norwegian engineer who is in the employ of the Braden Copper Mines in Chile, is reported to have stated that Americanisation is stamping its mark on South America. English investments, he says, are apparently being voluntarily transferred to the Colonies, and American financial concerns are taking over the management. The Americans have practically taken over the Chilean nitrate industry. The American Bond and Share Corporation is said to have bought up almost all the sources of water power and power stations between Mexico and Chile, Peru, Argentina, and Brazil. The object is to monopolise all the supply of electricity, and already deliveries to railways and to the large towns have been assured through local companies. In the case of the Braden Copper Mines Mr. Sontum states that he has established a hydro-electric works of 50,000 h.p. which supplies power to the company's railway and the various machines. The motors at the first station are to be changed, and he asked for offers in Scandinavia. A Swedish firm would not entertain the engineers' requirements in regard to the motors, submitting that their standard type was the best for the purpose. As a consequence it was necessary to go where it was possible to buy what was wanted.

A German Company's Decision.

The directors of the Felten & Guilleaume Company are stated to have decided to separate the company's iron and steel department and transfer it to a subsidiary company with a share capital of 18,000,000 marks. In this way this department will be rendered independent of the electrical departments, especially the copper and cable branches, a measure which is considered to be necessary, in this time of "interests" and syndicates, to obtain greater freedom of action.

An Italian Machinery Selling Organisation.

The long-pending negotiations for the formation of a common sales office for the Italian works which produce large electrical machines are stated to have now reached a critical point. As a consequence of over-production and unrestricted competition in connection with all contracts thrown open to competition, prices have become unremunerative, and the position of the whole industry has been rendered unsatisfactory. The concerns interested in the negotiations are the Tecnomasio Brown-Boveri and the Cia. Gen. di Elettricità, which is closely associated with the American General Electric Company and the Berlin A.E.G., as well as the smaller undertakings of Marelli, Ansaldo, Breda, San Giorgio, and Savigliano. The negotiations have hitherto failed to mature owing to the quota claims put forward by some of the smaller works, not on the basis of present sales, but on future expectations. Should these difficulties not be overcome, it is assumed that the other works, which represent at least 80 per cent. of the aggregate production, will establish a common sales bureau on their own account.

Bulk Supply and Engineers' Salaries.

The Ilford Borough Council is to consider the advisability of suggesting to the Incorporated Municipal Electrical Association that there should be a grade of salaries for chief electrical engineers who are in charge of undertakings where part of the energy is purchased in bulk and part generated. At the last meeting of the Council the Electricity Committee reported the receipt of the revised scale of salaries for chief engineers and recommended to the Council that it be accepted as the Committee had no suggestions to make. Ald. Dane, however, who had raised the point at a previous meeting, said he considered that there should be a scale applicable to engineers like the Ilford electrical engineer (Mr. Arthur Shaw), who was in charge of an undertaking which was generating less than 25 per cent. of its electricity. He considered that "it could not be worth as much to buy and sell as to make and sell." The report of the Committee was accordingly referred back.

The E.D.A. Programme for October.

The programme of the British Electrical Development Association for October is devoted, in the main, to the Shop and Display Lighting Campaign, details being given of the arrangements which have been made for advertising in the national retail trade Press, with an illustration of one of the advertisements. An interim progress report and other activities are included. The suggested window display for the month, as will be seen from the accompanying illustration, is appropriately given over to electric fires, and the arrangement, though simple, is very striking. As usual, the material for dressing the window can be obtained from the Association. The literature for the month is also devoted to heating, and a list of pamphlets, with prices, is included. Illustrations of some effective posters are given, with a diary of Sales Conferences (1930-31) for the London, Provincial, and North-East Areas.

The E.D.A. October Window Display.

Great Britain's Radio Exports.

Statistics published by the *Wireless and Gramophone Trader* show that during July last British exports of radio apparatus were valued at £75,904, including valves to a value of £18,108. The Netherlands was the principal customer, with a share valued at £10,041 (valves £422). The next in order were South Africa, £9,659 (valves £1,480); France, £6,384 (valves £4,600); Australia, £5,777 (valves £1,857); Belgium, £4,535 (valves £1,301) and Switzerland, £4,183 (valves £376). The re-exports totalled £21,043, of which the Netherlands was credited with £17,782.

Edison Swan Sales Conference.

At the Grand Hotel, Scarborough, from September 14th to 18th, the Edison Swan Electric Co., Ltd., held its first sales conference since it took over the merchandising business of the British Thomson-Houston Co., Ltd., and Metro-Vick Supplies, Ltd. Managers of all the branch offices of the company assembled to hear and discuss addresses by the various heads of departments, and in an atmosphere of enthusiasm and good fellowship, future policy was outlined and new ideas were promulgated. Congenial weather allowed the company to enjoy excursions in the neighbourhood in the intervals of business at what was a very successful meeting. The members of the conference were entertained to dinner by their chairman, Mr. C. F. Spencer. It is hoped that the company will be able to hold a similar conference at least once a year.

Ediswan Branch Managers at Scarborough.

Brown-Boveri and the A.S.E.A.

According to the *Berliner Börsen-Courier*, the Swiss electrical manufacturing company, Brown Boveri A.G., has acquired a majority holding in the A.S.E.A. (the Swedish General Electric Company). This new combination represents a further stage in the alignment of Continental electrical manufacturers in a large trust to resist American influence. It follows on the transfer of control from the Swedish Ericsson Company to the Swedish Match combine and shows that in a short time two main groups will dominate electrical manufacture in Europe—the independents and the Americans.—*Financial Times.*

With reference to the above report we understand that the German paper named, contained a denial of the statement on the day following the original publication. Mr. S. H. Busch, managing director of the Asea Electric, Ltd., London, informs us that he has received a telegram from the managing director of A.S.E.A. of Sweden (Mr. J. S. Edstrom) to the effect that all rumours regarding combines between Brown Boveri and A.S.E.A., or Brown Boveri's acquisition of control over A.S.E.A. are without any foundation whatsoever. 95 per cent. of A.S.E.A. shares are in Swedish possession and, it is stated, will certainly remain so.

Irish Free State Electrical Imports.

The appended table shows the value of the imports of electrical machinery, apparatus, and cognate goods imported into the Irish Free State during the seven months ended with July last as compared with the corresponding period of 1929.

	January to July. 1929.	1930.
	£	£
Electrical machinery	208,781	187,898
Electric wires and cables ...	113,232	106,123
Electric lamps and parts ...	41,543	52,884
Wireless sets and parts ...	45,752	47,825
Other electrical goods	146,729	113,149
Copper wire	48,146	24,891
Totals	£604,183	£592,770

Wages in the Electrical Contracting Industry.

The National Federated Electrical Association announces that there will be a decrease of ½d. per hour in the wages of all grades in the electrical contracting industry upon the second pay-day in October, for the period covered by that pay-day. The rates per hour will then be as follows:—Grade A, 1s. 9¾d.; Grade B, 1s. 6¾d.; Grade C, 1s. 5¼d.; and Grade D, 1s. 3¾d.

The British Industries Fair.

A letter received from the organisers of the Birmingham Section indicates that the electrical side of the 1931 Fair will be far stronger than in preceding years. Special mention is made of the exhibits of water-heating apparatus, furnaces and ovens, refrigerators, and other electrical equipment which are being arranged.

E.D.A.-E.L.M.A. Shop and Display Lighting Campaign.

At a conference held in Belfast on September 17th, a resolution was passed pledging all electrical interests in the area to give their wholehearted support to the Campaign. Arrangements are being made for surveys to be carried out, while a lecture demonstration tour is being organised. At the Belfast Electrical Exhibition (October 2nd-9th) a shop window lighting display has been erected on the E.D.A. stand.

The Master Sign Makers' Association has arranged for a travelling van of electric signs to tour the country, commencing October 6th, and has retained the services of Mr. F. G. H. Macrae as lecture-demonstrator. Arrangements are being made by numerous supply undertakings to park the van in a convenient place, and to call a meeting of shopkeepers to whom a lecture demonstration will be delivered. E.D.A. Circles have been reformed or established for the first time in the following areas in connection with the campaign:—Hertford (North Metropolitan E.P. Co.), Hackney, Hammersmith, Plymouth, Bolton, Jarrow, Gateshead, Houghton-le-Spring, and Redcar.

Proposed Amalgamation in Chile.

Reuter's Trade Service learns from Santiago that the President has put before Congress a proposal to organise a national company to take over all existing electrical and gas plants and services. At present over 140 public service electricity supply companies are operating in Chile and their combined annual production exceeds 220,000,000 kWh, with a consumption *per capita* of over 136 kWh. Chile, which has suffered less than any South American country from the world industrial depression, is now regarded as one of the best markets for electrical machinery and apparatus in the Americas. The annual value of this trade already exceeds £1,000,000, and during 1931 extensive orders are expected to be placed for additional generating equipment, transmission, distributing and other electrical apparatus. The United Kingdom has been third on Chile's electrical trade list during the past few years, supplying approximately 20 per cent. of the electrical imports.

New Zealand Emergency Power Plant.

The Minister of Public Works announces that he is submitting a scheme to the Cabinet for the provision of steam stand-by installations throughout the country, in order to be prepared for possible future failures of the larger hydro-electric schemes. The Minister's decision has been influenced by the Arapuni failure and the serious power shortage in the Canterbury area, owing to the abnormal lack of rainfall in the Lake Coleridge watershed.—*Reuter* (Wellington).

A Guide to Albania and Greece.

For the guidance of commercial visitors to Albania and Greece there has been prepared under the auspices of the Department of Overseas Trade a little booklet (Reference No. C3357) containing a great deal of information. This covers such matters as railway travelling, hotels, clothing, communications, banking, &c. Copies of the booklet can be obtained from the D.O.T. by members or representatives of British firms interested in the subject.

Electrical Production Figures.

The B.E.A.M.A. Index of Activity, quoted by the *Board of Trade Journal*, gives a figure of 114.6 (1924=100) for August, as compared with 105.2 for July and 107.3 for August, 1929. Upon the 1924 basis the production of electricity during August was 142 per cent., against 155 per cent. in July and 139 per cent. in August last year.

A "Holophane" Architects' Conference.

On September 24th a conference of architects was held at the headquarters of Holophane, Ltd., Westminster. Commencing at 10 a.m. lectures were delivered by members of the Holophane staff and Mr. J. S. Dow, hon. secretary of the Illuminating Engineering Society. The thirty architects who attended the conference were welcomed by Mr. H. Thompson, the managing director of the company, and in the evening the day concluded with a dinner at the Criterion Restaurant.

Electrical Exhibition at Johannesburg.

An electrical exhibition is to be held in Johannesburg City Hall from November 24th to 29th, corresponding with the anniversary celebrations of the South African Institution of Electrical Engineers. The exhibition will be sponsored by the Johannesburg Municipal Electricity Department.

Unemployment.

There was a decrease of 36,158 in the number of persons on the registers of Employment Exchanges in Great Britain during the week ended September 15th. At that date the total was 2,103,413, as compared with 2,139,571 on September 8th, and 1,147,519 on September 16th, 1929.

Wages in the Cable-making Industry.

The Joint Industrial Council for the Electrical Cable Making Industry informs us that there will be no "cost-of-living" reduction in wages in the industry on the third pay-day in October.

Canadian Radio Trade.

Two-thirds of the wireless apparatus in use in Canada is manufactured in the Dominion and the Canadian industry is making rapid progress. During 1929 production was valued at $20,966,000, factory prices; imports from the United States amounted to $10,784,000. The Canadian production for the calendar year 1929 shows an increase of 65 per cent. on the previous year. The use of wireless is rapidly spreading all over the Dominion. During the fiscal year ending in 1929 licences were issued to 423,557 persons compared with 295,756 for the previous year.—*Reuter's Trade Service* (Ottawa).

Bankruptcy Proceedings.

W. H. Thornton, 25, Bridge Street, Burnley, Lancs., electrical and wireless engineer.—The application for discharge herein was heard on September 18th at the County Court House, Burnley. The receiving order was made in 1929, and the statement of affairs then lodged showed ranking liabilities of £735, and assets estimated to produce £108, which had realised only £83. A first and final dividend of 4½d. in the £ had been paid on proofs for £544. It was stated that the debtor was prepared to consent to judgment for £70, and His Honour granted the discharge subject to the payment of that sum.

H. F. Spence, 2, Eureka Terrace, Honiton, lately trading as H. F. Spence & Sons, electrical engineer.—The adjourned public examination of this debtor was held recently at the Castle, Exeter. In reply to questions, the debtor said that a branch business at Sidmouth incurred losses. Since the present proceedings had been instituted, his two sons had carried on the business, but he had not assisted them financially in any way. Dissatisfaction was expressed with certain statements lodged by debtor, and the hearing was further adjourned to enable investigations to be made.

T. J. Horn, 5, Harrogate Parade, Moortown, Leeds, trading as Thomas Horn & Co., electrician.—The public examination of this debtor was held on September 23rd at the County Court House, Albion Place, Leeds. The statement of affairs lodged disclosed a deficiency of £508. The debtor stated that he called his creditors together last May and made an arrangement with them. The hearing was adjourned for formal closing.

T. S. Hanson, 26, Nether Hall Road, Doncaster, electrical contractor.—The adjourned public examination herein was held recently at the County Court Hall, Sheffield. According to the statement of affairs previously filed, there were liabilities of £1,572 and assets of £813. The hearing was concluded.

M. K. Clements (K. Raymond), wireless apparatus dealer, 27 and 28a, Lisle Street, Leicester Square, W.C.—First and final dividend of 9d. in the £, payable on October 6th at 150, Southampton Row, W.C.1.

P. R. H. W. Baynton, trading as "The Scunthorpe Service and Charging Depôt, 38, Wells Street, Scunthorpe, wireless and electrical engineer.—Receiving order made September 23rd on debtor's own petition.

R. Pearson, trading as R. Pearson & Sons, "Xtra Point" Electrical Works, Walshaw Road, Bury, Lancs., electrical accessory manufacturer. Receiving order made September 19th on a creditor's petition. First meeting, October 6th; public examination, November 11th, at the Court House, Mawdsley Street, Bolton.

C. F. M. Metcalf, 8, Cow Green, Halifax, electrical engineer.—Application for discharge to be heard at the County Court House, Prescot Street, Halifax, on October 23rd.

R. Hilton, 81, Blackburn Street, Radcliffe, electrical engineer.—Discharge suspended for six months until March 11th, 1931.

Company Liquidations.

Symphony Gramophone & Radio Co., Ltd.—The statement of affairs filed in the compulsory liquidation of this company shows total liabilities of £144,831 (unsecured £87,462); assets of £54,939; and a deficiency of £222,481 with regard to contributories. The following are the principal creditors:—

	£		£
British Domolac Co., Ltd.	313	Mullard Wireless Service Co., Ltd. ...	142
British Thomson-Houston Co., Ltd....	588	Pitchford & Thomas, Ltd.	1,487
Ferranti, Ltd.	169	Rothermel Corpn., Ltd.	477
Grosvenor Battery Co,. Ltd.	808	Sankey, J. & Sons, Ltd.	1,047
Igranic Electric Co., Ltd.	1,057	Symphony Gramophone & Radio (Foreign), Ltd. ...	4,517
Lessel Hutcheon, Ltd.	361	Saxton Chatteris & Co.	5,909
L.P.S. Electrical Co.	104	Wolverhampton Corporation	290
Morris, J. R.	194	Ward & Goldstone, Ltd.	122
Bath Artcraft, Ltd. ...	850	Marconi's Wireless Telegraph Co., Ltd.	10,797
Cossor, A. C., Ltd. ...	169	Davies, D. M., Woodwork, Ltd.	1,517
Chloride Electrical Storage Co., Ltd. ...	2,192	Davies, D. M.	1,400
Commercial Publicity Co.	453	Six-Sixty Radio Co. ...	6,888
Collaro, Ltd.	182		
Davies, F.	189		
Edison Swan Electric Co., Ltd.	765		
English Steel Corpn.	2,206		

Sphinx Electric, Ltd.—The statutory first meetings of creditors and shareholders were held at Carey Street on September 30th. It was decided to leave the liquidation in the hands of the Official Receiver, and a committee of inspection, consisting of representatives of the five principal creditors, was appointed.

David Ashton & Co., Ltd.—Winding up voluntarily. Mr. B. C. Davies, 6, East Parade, Sheffield, appointed liquidator, September 17th.

Premier Wholesale Electric Co. (Stockport), Ltd., and Premier Electric Co. (Stockport), Ltd.—Meetings of members and creditors are called for October 31st, at 12, St. Peter's Square, Stockport, to hear an account of the winding-up by the liquidator, Mr. W. Chaloner.

Chemico-Electric Co., Ltd.—A meeting is called for October 27th at 7 and 8, Norfolk Street, Strand, W.C.2, for the purpose of hearing an account of the winding-up by the liquidator, Mr. A. J. Bennell.

Standard Platinum Contacts, Ltd.—Last day for receipt of proofs for dividend, October 13th. Liquidator, Mr. G. D. Pepys, Senior Official Receiver and Liquidator, 33, Carey Street, W.C.2.

Television, Ltd.—Particulars of claims by October 20th to Mr. F. Rowland, 76, Finsbury Pavement, E.C.2, joint liquidator.

Alderley & Wilmslow Electric Supply, Ltd.—A meeting of members will be held on November 10th at Broad Sanctuary Chambers, Westminster, S.W.1, to receive an account of the winding-up of the company by the liquidator, Mr. H. Fraser.

Dissolution of Partnership.

Auto-Window Display Signs, electric sign manufacturers, 21, Copthall Avenue, E.C.—Messrs. L. L. Waters and H. Thomas have dissolved partnership.

Trade Announcements.

The business of Messrs. E. S. Russell & Co., 243, Great College Street, N.W.1, has been converted into a private limited company—the Service Electric Co., Ltd. There will be no change in the management of the business.

Mr. R. H. Spence, electrical contractor, has changed his address to 9, Station Road, Egham, Surrey. He asks for copies of new lists, showcards, &c.

Messrs. Parmiter, Hope & Sugden, Ltd., have opened new offices at 34, Victoria Street, S.W.1. Mr. G. A. Long, who has been on the works staff for many years, has been appointed London manager.

The registered address of the United River Plate Telephone Co., Ltd., is now Connaught House, Aldwych, W.C.2 (telephone: Holborn 8765).

Mr. E. Griffiths has opened a showroom at Langham House, 308, Regent Street, W.1, for "Monolamp" fittings, for which he is agent.

Carron Company announces that Mr. W. C. Aynsley, 22, Oxford Street, Newcastle-upon-Tyne (telephone: Central 3668) has been appointed the company's agent for the sale of its electrical goods in Newcastle and North-East area.

New Catalogues and Lists.

Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester.—Two descriptive leaflets Nos. 382/1-1 and 383/1-1, giving details of the type "OD" distribution transformers, and type "R" off-circuit transformer tapping switches. Also leaflets Nos. 258/1-1, 341/0a-1, and 621/1-1, describing, respectively, type BBH oil-circuit breakers, directional and non-directional induction-pattern protective relays, and motor convertors.

British Thomson-Houston Co., Ltd., Rugby.—A priced folder of "Mazda" 150-V electric lamps.

Condrup, Ltd., 77 & 78, Fore Street, London, E.C.2.—A booklet showing various types of electric poker machines for burning and etching on wood, leather, textiles, ivory, cork, &c.

Oswald Record & Co., 17, Victoria Street, S.W.1.—A leaflet illustrating the Rosenthal solid-core, fin-type, insulators.

Ellison Insulators, Ltd., Perry Barr, Birmingham.—A well-produced publication dealing with "Tufnol" insulating materials.

Chesterton Jones & Co., Ltd., David Works, Tyseley, Birmingham.—List No. 930, giving prices and materials of electric fires, cookers, water heaters, and other domestic appliances.

The Wholesale Fittings Co., Ltd., 23, 25, 27 and 37, Commercial Street, London, E.1.—A priced catalogue of electrical accessories (No. E.250), containing 84 pages of illustrations and matter dealing with switches, holders, wires, cables, bells, brackets, &c.

Korting & Mathiesen Electrical, Ltd., 711 and 715, Fulham Road, London, S.W.6.—List No. L.91028/a, giving particulars of a range of lanterns for general exterior and interior lighting; and List L.1829/a, dealing with silvered mirror reflectors for shop-window lighting and for concealed lighting systems in general.

Igranic Electric Co., Ltd., 149, Queen Victoria Street, London.—A general catalogue of radio components and a copy of "The Link Between," a publication dealing with modern metal-rectifying apparatus.

O. N. Beck, 11, Queen Victoria Street, London, E.C.4.—A booklet on universal electric boiler-scaling equipment.

The Cooper-Stewart Engineering Co., Ltd., 136-137, Long Acre, London, W.C.2.—A folder illustrating the "Stewart" toaster-hotplates, heater-kettles, irons, grillers, boiling rings, and other domestic appliances.

Best & Lloyd, Ltd., Cambray Works, Handsworth, Birmingham.—A well-produced catalogue of the latest models of "Best" electric fires.

Johnson & Phillips, Charlton, London, S.E.7.—Leaflet SFa2/1, dealing with a new oil-immersed switch-fuse (type M.C.11).

Carron Company, Carron, Falkirk.—A well-produced catalogue (E.F.21) containing over 40 pages of particulars and prices of the company's electric fires, &c. Some excellent illustrations in colour are included.

W. T. Henley's Telegraph Works Co., Ltd., Holborn Viaduct, E.C.1.—Booklet U.D.B.—"How to make Cablegrip Service Joints." This very useful publication comprises a series of 30 photographs with brief notes showing the jointing of a service cable from the opening up of the box right up to the final closing; it should prove of considerable service to jointers.

Ferranti, Ltd., Hollinwood, Lancs.—A quantity of literature giving details of the Ferranti "Junior" electric fire, radio components, a.c. mains radio receivers, "Dynamic" speakers (list Wa 550), and summation metering equipment (list Ga 370).

The Mullard Wireless Service Co., Ltd., Mullard House, Charing Cross Road, London, W.C.2.—Three publications (Nos. G.1, G.2, and G.3) dealing, respectively, with 2-volt valves, a.c. mains valves and rectifiers, and small accessories and "Pure Music" speakers. The 1930-31 edition of the "Rapid Valve Guide" gives in handy form useful information concerning the whole range of the company's products in a form suitable for the non-technical as well as for the more advanced users.

Radio Instruments, Ltd., Purley Way, Croydon.—The new season's catalogue giving full descriptions, technical data, prices, &c., of all the company's products; also a descriptive leaflet on the new all-insulated h.t. units, and two broadsheets.

Edison Swan Electric Co., Ltd., 123-5, Queen Victoria Street, E.C.4.—A showcard with an excellent illustration of a country lane at night illuminated by the light of "Ediswan" motor lamp bulbs. Particulars are given of voltages, dimensions, and prices of headlights, side, tail, dash, and interior lights.

Runbaken Repair & Spare Service, Magneto Works, Ardwick, Manchester.—A circular letter announcing the establishment of a repairing department for speedometers, clocks, windshield wipers, &c., with a list of charges for repairs.

Meech Electric Drives, Ltd., 19-20-21, Farringdon Street, E.C.4.—An illustrated leaflet (No. 121) describing a.c. electric driving and controlling equipments for flatbed and small rotary printing presses.

J. H. Tucker & Co., Ltd., King's Road, Tyseley, Birmingham.—An abridged catalogue (Ref. G.7) containing particulars of many new lines of switches, switchplates, lampholders, fuseboards, &c. Folder G.6/C gives particulars and prices of products coming within the scope of the "Tucker" quantity buying schedule.

Hobday Bros., Ltd., 21-27, Great Eastern Street, E.C.2.—Catalogue No. 76 contains 124 pages of matter dealing with the company's 1930-31 stock of domestic electrical apparatus, switchgear, battery chargers, &c.

T. B. Morley & Co., Ltd., Jameson Street, Hull.—A brochure illustrating, in most cases in colour, the latest types of "Morco" moulded and decorated glassware, ceiling bowls, reflectors, enclosed units, and fittings.

Siemens Electric Lamps & Supplies, Ltd., 38-39, Upper Thames Street, London, E.C.4.—The new season's decorative glassware fittings are shown in colour in catalogue No. 435, which replaces the previous catalogue No. 202.

Alexander Wright & Co., Ltd., 1, Westminster Palace Gardens, Artillery Row, Westminster, London, S.W.1.—A leaflet announcing new pattern "Simmance" dead-beat vacuum and pressure recorders.

Local Exhibitions.

Motherwell and Wishaw.—An electrical exhibition promoted by the Electrical Association for Women was held in Wishaw House, the residence of Lord and Lady Belhaven, on September 13th, and valuable assistance was rendered by Mr. W. D. Brassington, A.M.I.E.E., electrical engineer of the burgh of Motherwell and Wishaw. Most of the leading manufacturers were represented, and the electrical apparatus, which included up-to-date models of cookers, fires, vacuum cleaners, and a multitude of other appliances were displayed in the different apartments of the mansion. The opportunity was taken by Mr. Brassington to carry out a publicity campaign introducing attractive schemes whereby electrical appliances and installations can be acquired on hire-purchase terms. Lady Belhaven, Lady Weir, Mr. Rosslyn Mitchell and Provost Anderson, late convener of the Electricity Committee, addressed the gathering, and paid tribute to the excellence of the display. At the conclusion of the exhibition the front of Wishaw House was illuminated by means of coloured floodlights providing an effective finale to a successful day.

Bradford.—The Corporation Electricity Department has a comprehensive display of domestic appliances, on a series of six stands, at a Home, Industry and Fashions Exhibition which was opened on September 24th. Electric cooking, washing, heating, ironing, cleaning, and other domestic appliances are being demonstrated daily. Others who are exhibiting electrical apparatus are Messrs. A. Ridgway & Co., Messrs. Henry Wilson (Bradford), Ltd., and the British Vacuum Cleaner and Engineering Co., Ltd.

Dewsbury.—At the fourth annual Trades and Fashions Exhibition promoted by the Dewsbury Chamber of Trade, and opened at the Town Hall on September 27th, the Corporation Electricity Department had four stands with a fully representative display of electrical domestic appliances. Electrical apparatus was also shown by Messrs. Beaumont & Blackburn; Hepworth & England; Mr. Walter Angus; Singer Sewing Machine Co., and Messrs. Ward & Co.

Stoke-on-Trent.—The Corporation Electricity Committee is to make arrangements for a series of electrical exhibitions in the town halls at Burslem, Stoke, Longton, Tunstall, Stoke Kings, and Fenton.

Book Notices.

"A Catalogue of British Scientific and Technical Books." Third edition. Pp. xxi+754. London: British Science Guild, 6, John Street, W.C.2. Price 20s. net.—This catalogue, "covering every branch of science and technology, carefully classified and indexed," has been prepared by a committee appointed by the British Science Guild, of which Sir Richard Gregory is the chairman. The present edition includes 13,915 titles, which is more than double the number contained in the original volume published in 1921. The catalogue is limited to books published by British firms and in their lists up to September, 1929, and it may be said to represent the position at that date of British scientific literature so far as text-books and works of reference in the fields of science and technology are concerned. The titles are classified under 64 main groups and nearly 700 sub-classes, each item including the author's name, title of book, size of page, number of pages, date of last edition, name of publisher, and price. Following the main catalogue are a list of publishers, index of authors, and index of subjects. The general plan is that followed in the previous editions, but a slight rearrangement has been made to provide a better grouping of the subjects, and the sub-division of a number of the headings. This comprehensive and scientifically-compiled catalogue should prove invaluable as a guide to the selection of literature dealing with every branch of electrical science.

"The Evolution of Industrial Organisation," by B. F. Shields. Second edition. Pp. xv+414. London: Sir Isaac Pitman and Sons. Price 10s. 6d. net. The new edition of this work incorporates several additional sections and has been revised throughout. The additions include an examination of rationalisation in certain important countries; an analysis of the consumers' co-operative movement, with special reference to its British aspects; an exposition of instalment selling, with a consideration of some of its salient economic and social effects; a brief investigation of family allowances; and a note on the Priestman wage system. In a new chapter an effort has been made to trace the evolution of British and Irish Trade Unionism, and to analyse its organisation and the methods employed in effecting its objects.

"The Electrical Contractors' Association of Scotland Year Book and Diary, 1930-31." (Pp. 134 and diary.) Edinburgh: The Association. Price 3s. net.—The new edition of this annual includes portraits of the president (Mr. D. D. Morris) and other officers of the Association. A table of Scottish

electricity supply undertakings is given with voltages, systems and charges, together with the other usual features of interest and assistance to electrical contractors.

"Business Charts," by T. G. Rose. Pp. x+94; figs. 31. London: Sir Isaac Pitman & Sons, Ltd. Price 10s. 6d. net.

"Ralph Stranger's Wireless Library for the Man in the Street." Nos. 8-12. Sixty-four pages per volume; illustrated. London: George Newnes, Ltd. Price 1s. net per volume.

Business Research and Management.

Mr. A. G. H. Dent, the chairman of the Business Research and Management Association of Great Britain, informs us that the opening meeting of the Association's 1930-31 session will take place at Anderton's Hotel on October 7th, when Sir Francis Goodenough will speak on "Empire Economic Research." At the next meeting Mr. H. Williams, secretary of the Empire Economic Union, will speak on "Empire Rationalisation." On December 3rd Sir Hugo Hirst will deliver an address, and at the January meeting the speaker will be Mr. F. L. McDougall, of the Empire Marketing Board, who will take as his subject "Organising Empire Market Research." The second half of the session's programme will be devoted to aspects of the subject of budgetary control.

Prices of Materials.

The following prices are only general, and they may vary according to quantities and other circumstances:—

	CHEMICALS, &c.	Price Sept. 30th	Fortnight's inc. or dec.
a	Acid, Oxalic ... ... per lb.	5¾d.	...
a	Ammoniac, Sal ... ... per ton	£60	...
a	Ammonia, Muriate (large crystal) ,,	£52	...
a	Bisulphide of Carbon ... ... ,,	...	...
a	Borax ... ... ,,	£17	...
a	Copper Sulphate ... ... ,,	£25 10s.	...
a	Potash, Chlorate ... . per lb.	3d. to 4d.	...
a	,, Perchlorate ... ... ,,	5½d.	...
a	Shellac ... ... per cwt.	£13 10s.	...
a	Sulphur, Commercial ... ... ,,	£11	...
a	,, Roll ... ... ,,	£11	...
a	Soda, Chlorate ... ... per lb.	3d.	...
a	,, Crystals ... ... per ton.	£5 to £5 5s.	...
a	Sodium Bichromate, casks ... per lb.	3¾d.	...
	METALS, &c.		
b	Aluminium, Ingots ... ... per ton.	£95 to £100	...
b	,, Wire ... ... per lb.	1/1 to 1/9	...
b	,, Sheet ... ... ,,	1/1 to 2/9	...
p	Babbitts Metal and Anti-friction Metals—		
	Grade I ... ... per ton net.	£123	£7 dec.
	Grade II ... ... ,, ,,	£90	£3 dec.
	Grade III ... ... ,, ,,	£53	£3 dec.
c	Brass (rolled metal 2" to 12" basis) per lb.	8¼d.	¼d. dec.
c	,, Tubes (solid drawn) ... ,,	10¼d. to 10½d.	¼d. dec.
c	,, Wire, basis ... ... ,,	8¾d.	¼d. dec.
c	Copper Tubes (solid drawn) ... ,,	11½d.	¼d. dec.
g	,, Bars (best selected) ... per ton	£77	£2 dec.
g	,, Sheet ... ... ,,	£77	£2 dec.
g	,, Rod ... ... ,,	£77	£2 dec.
d	,, (Electrolytic) Bars ... ,,	£49	£3 2s. 6d. dec.
d	,, ,, Sheets ... ,,	£143 10s.	...
d	,, ,, Wire Rods ,,	£59	£3 2s. 6d. dec.
d	,, ,, H.C. Wire per lb.	7¾d.	¾d. dec.
f	Ebonite Rod ... ... ,,	2/3 to 2/6	...
f	,, Sheet ... ... ,,	2/3 to 2/6	...
n	German Silver Wire ... ... ,,	2/3	...
h	Gutta-percha, fine ... ... ,,	nom.	...
h	India-rubber, Para fine ... ... ,,	5½d.	1d. dec.
i	Iron, Pig (Cleveland No. 3.) ... per ton.	63/6	12s. dec.
l	,, Wire, galv. No. 8. P.O. qual. ,,	£20	...
g	Lead, English pig ... ... ,,	£18 5s.	£1 5s. dec.
g	Mercury ... ... per bot.	£22 10s. to £22 15s.	...
e	Mica (in original cases) small ... per lb.	6d. to 3/-	...
e	,, ,, medium ,,	4/- to 8/-	...
e	,, ,, large ... ,,	10/- to 20/- & up	...
p	Phosphor Bronze, plain castings ,,	1/1½d.	...
p	,, ,, drawn bars & rods ,,	1/1d.	...
p	,, ,, rolled strip & sheet ,,	1/1½d.	...
p	,, ,, wire ... ... ,,	1/1½d.	¼d. dec.
o	Platinum ... ... per oz.	£7	10s. inc.
d	Silicium Bronze Wire ... ... per lb.	9¾d.	¼d. dec.
r	Steel, Magnet, in bars ... ... ,,	7¾d.	...
g	Tin, Block (English) ... ... per ton	£125 15s. to £126 15s.	£9 15s. dec.
n	,, Wire, Nos. 1 to 16 ... ... per lb.	3/2	...

*For 1 cwt. lots. Special quotations against definite specifications.

Quotations supplied by

a	G. Boor & Co.	g	James & Shakespeare.
b	The British Aluminium Co., Ltd.	h	Edward Till & Co.
c	Thos. Bolton & Sons, Ltd.	i	Bolling & Lowe.
d	Frederick Smith & Co.	l	Richard Johnson & Nephew, Ltd.
e	F. Wiggins & Sons.	n	P. Ormiston & Sons.
f	India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.	o	Johnson, Matthey & Co., Ltd.
		p	C. Clifford & Son, Ltd.
		r	W. F. Dennis & Co.

Messrs. James Forster & Co., in their letter dated September 27th, said that the closing prices for lead last week were unchanged. A moderate demand from consumers was seen at the beginning of the week and this imparted a slightly firmer tone to the market. Later, with little support from producers and no further buying of any consequence from consumers, prices again eased and closed with a weak tone. "The undoubted tendency of the metal for some time past has been to decline to a lower level and the existing control is only delaying the fall which will inevitably take place sooner or later."

Lighting and Power Notes.

Bedford.—Underground Lines Cheaper than Overhead.—Reporting upon l.p. distribution in villages, the Corporation Electricity Committee states that, on consideration of the Committee's detailed proposals and the estimates submitted by the borough electrical engineer, the Electricity Commissioners have intimated that they will not raise any objection to the l.p. cables being laid underground in the villages in the area of supply under the rural demonstration scheme. This is a notable departure from the past and present practice throughout the country, and it is due to the borough electrical engineer having established the fact that it is possible to lay and maintain underground l.p. cables more cheaply than to distribute overhead, in special cases, and thus to assist in preserving village amenities.

The Committee has given the borough electrical engineer instructions to put in hand the work of constructing an underground line to Wootton Pillinge at a cost of £16,412.

Bexhill.—New Sub-station.—The Corporation Electricity Committee is to erect a sub-station in Sutherland Avenue at a cost of £3,000.

Biggar.—Inauguration of Supply.—An electricity supply has now been made available for Biggar from the Bonnington power house at Lanark. The total cost of bringing the cable to the town was £15,000, which has been borne by the Clyde Valley Electrical Power Co.

Birmingham.—Street Lighting Improvements.—The *Birmingham Post* states that a new lighting system is being installed over the whole of Hagley Road, from Five Ways to the city terminus at the junction with Lordswood Road. Following the abandonment of the trams on this route, the standards which were formerly used to carry the overhead wires will now be used as lamp standards. Both electricity and gas will be used in lighting the thoroughfare, and the respective departments have been allocated various lengths of the roadway on which the different systems of lighting will be installed.

Brighton.—Loan Sanctioned.—The Corporation Electricity Committee has received sanction from the Electricity Commissioners to the extension of the Southwick generating station.

Extensions.—Application is to be made by the Corporation Electricity Committee for sanction to a loan of £1,000 for plant required in connection with a supply to the Brighton Equitable Co-operative Society's new premises in London Road. Mains extensions are also to be carried out at an estimated cost of £887.

Street Lighting.—The Electricity Committee is to erect street lamps on housing estates at a cost of £511.

Bromley (Kent).—Year's Working.—An increase in the electricity sold from 2,965,790 to 3,480,102 kWh is shown in the annual report of the Corporation Electricity Department (engineer: Mr. W. G. Trend) for the year ended March 31st last. The total revenue of the undertaking amounted to £48,680, which compares with £46,652 in the preceding year. Working expenses rose from £21,333 to £28,283, leaving a gross profit of £20,398 (£25,319). After deducting loan interest, loan repayment and income tax, there was a net surplus of £4,814, as against £13,002 in the previous year. Capital expenditure during the year amounted to £20,549, of which £10,628 was for mains and services; the total now spent on the undertaking is £183,221. The maximum load increased from 1,977 to 2,265 kW, the number of kW connected rising from 8,172 to 9,348. The average price obtained per kWh fell from 3.66d. to 3.27d., a reduction in the charges for heating, cooking, and power being made during the year under review. The report states that it will be necessary in the near future for the Electricity Committee to consider the question of the disposal of the remainder of the d.c. plant in favour of a total bulk supply.

Caerphilly.—Re-acquisition of Electricity Undertaking.—With reference to the re-acquirement of the electricity undertaking by the Urban District Council, the Electricity Commissioners have expressed themselves generally in favour of the Council's acquiring the undertaking, and an independent engineer is to be engaged to ascertain the value of the assets to be taken over.

Canada.—Hydro-electric Development.—It is expected that work will be started at once on the construction of the Abitibi Canyon dam and power house, following the award of the contract to the Dominion Construction Co., Ltd., of Toronto. The construction is expected to occupy two years, power to be delivered by October 1st, 1932. The station is to be situated about 64 miles north of Cochrane, Ont., and only a few miles from the main line of the Timiskaming and Northern Ontario Railway. Details of construction indicate that a concrete dam is to be erected on solid rock foundations and a power house to be located in the gorge below will contain five generating units of not less than 55,000 h.p. The development marks the entry of the Ontario Hydro-Electric Power Commission into the eastern section of northern Ontario. To deliver the power at Sudbury,

where an urgent demand exists in connection with the nickel-copper mining operations, will require one of the longest transmission lines in Canada, the distance from the power site to the city as the crow flies being in the neighbourhood of 250 miles.

Two hydro-electric developments under construction on the Winnipeg river in Manitoba are expected to come into operation in 1931, says *Natural Resources*, Canada. The first of these to be undertaken was that of the Northwestern Power Company, a subsidiary of the Winnipeg Electric Company, at Seven Sisters Falls, and the second is that of the city of Winnipeg at Slave Falls, about five miles downstream from the city's existing station. The Seven Sisters development is situated on the main channel of the Winnipeg river immediately above the mouth of the Whitemouth river. The ultimate installation planned will consist of six units of 37,500 h.p. each operating under a head of 66 ft. and utilising the complete flow of the river. It is expected that the plant will come into operation with three units working under partial head and producing 40,000 h.p. The Slave Falls development is being constructed a short distance below the actual falls where an island divides the river and is designed for the installation ultimately of eight 12,000-h.p. units; the initial installation will consist of two units.

Chichester.—Special Order.—It was reported at a recent meeting of the Town Council that the Ministry of Transport had excluded Aldingbourne, Barnham and Eastergate from the supply area of the Bognor Gas and Lighting Company. The Council is now to apply for a Special Order to include these places together with Tangmere and Boxgrove. The cost of the scheme is estimated at £15,529.

Continental. — Sweden. — The Aktiebolaget Skaanska Cementgjuteriet has obtained an order from the Kraft Aktiebolaget Gullspaang-Munkfors for the construction of a new power station of about 10,000 kW at Munkfors, not far from the mouth of the River Letaelven in the Skagern Lake. The station will be completed in 1933.—*Reuter's Trade Service* (Stockholm).

Italy.—The Società Forze Elettriche Valtanaro has recently secured a concession to establish a 2,995-h.p. hydro-electric station to utilise the water power of the River Broblio-Pesio, near Mondovi, Cuneo Province. The Società Generale Edison di Elettricita is also about to proceed with the establishment of a 6,930-h.p. plant to utilise the water power of the Melazzo and Riva Mandei Rivers near Monte Crestese (Novara).

Coventry.—Loans.—The Corporation Electricity Committee is applying for sanction to a loan of £75,281 for various electricity purposes.

Croydon.—Loans Sanctioned.—The Corporation Electricity Committee has obtained sanction to the borrowing of £2,405 for sub-stations, £13,157 for mains, and £10,054 for plant.

New Cables.—The Committee is to lay cables to supply premises in Cherry Orchard Road at a cost of £610.

Eastbourne.—Year's Working.—We have received from Mr. J. K. Brydges, borough electrical engineer, a copy of his annual report together with a statement of accounts for the year ended March 31st last. The total income from the undertaking amounted to £121,383, as compared with £120,843 for the preceding year. Working expenses increased from £69,676 to £78,956, the gross profit declining from £51,167 to £42,427. When provision had been made for capital and other charges, there was a net surplus of £6,233, as compared with £15,794 in 1928-29. Expenditure during the year on capital account amounted to £50,463, of which £34,943 was for mains and services: the total now spent on the undertaking (excluding £13,229 for rental wiring installations) is £688,723. Electrical energy sold increased from 13,292,679 to 15,124,322 kWh and the maximum load from 8,015 to 8,065 kW. The average price obtained per kWh sold fell from 1.94d. to 1.74d. Provision for a partial supply is to be made by the Central Electricity Board for this winter from a neighbouring undertaking.

Fleetwood.—Proposed Change-over.—The Town Council is applying to the Electricity Commissioners for permission to alter the system and pressure of electricity supply in the whole district. It is not intended to make any change immediately.

Hawarden.—Proposed Extensions.—In order to ascertain whether there is a sufficient demand to justify supplying electricity, the Rural District Council has decided to have a canvass made of the districts of Tryddyn, Caer Estyn and Sarn-lane.

Lancaster.—Extensions.—The work in connection with the Corporation's Fringe order, which includes the supply of electricity to Hest Bank and Bolton-le-Sands, is to begin at once. The Unemployment Grants Committee has intimated its willingness to make a grant towards the interest on the loan of £25,059 which is required.

Lathom and Burscough.—Special Order.—The Electricity Commissioners have submitted to the Minister of Transport for confirmation a Special Order made by them authorising the Lancashire Electric Power Co. to supply electricity in the urban districts of Lathom and Burscough and Skelmersdale and parts of the rural districts of Wigan and West Lancashire.

London.—Battersea.—The Borough Council Electricity Committee is to lay mains in all streets where no services are provided, lay mains for converting gas lamps to electricity, and provide services for new consumers, at a total cost of £19,000.

Poplar.—The Borough Council Electricity Committee has prepared a scheme for the hire-purchase of electrical apparatus for use in shops, &c.

Southwark.—Sanction has been received by the Borough Council to a loan of £9,600 for mains extensions.

Manchester.—Progress During July and August.—During the months of July and August the Corporation electricity undertaking showed an increase of 4,373 kW in connections, bringing the total up to 436,475 kW. Applications received for supplies, including additional supplies, amounted to 2,230 and represented a total of 4,886 kW. The number of hired cookers connected increased by 191, making a total of 6,650 now on circuit. Applications for the hire of cookers numbered 242. Six new sub-stations were put into commission and new plant was installed at five existing sub-stations. The change-over from d.c. to a.c. had been completed in the cases of 11,035 consumers up to September 10th, while sanction had been given and work was in progress involving 1,859 consumers.

Mexico.—New Power Plant.—The State Government has granted a concession for the construction of a large power plant at Monterey, the capital of the State of Nuevo León, and the most important industrial town in north-east Mexico. The project includes an entirely new electrical plant, boiler plant, sub-station, and, later on, a complete reorganisation of the present distributing system. A number of contracts to take electrical energy from the new plant for power purposes have been concluded with the local steel-works, smelting works, textile and flour mills, breweries and other industrial concerns.—*Reuter's Trade Service* (Monterey).

Northern Ireland.—Proposed Derry-Limavady Extension.—The suggested extension of the Derry-Limavady scheme is being considered. It is proposed that Derry municipal power station should supply Limavady. At Limavady Major J. A. Ritter owns the Limavady Electrical Supply Co. and at the moment is seeking a Special Order from the Electricity Commissioners to be constituted the sole supplier for Limavady and district.

Porthcawl. — Electricity Supply Negotiations. — The *Western Mail* states that arrangements are now practically completed for the Bridgend Urban District Council to supply, through the General Electric Co., Ltd., electricity to Porthcawl.

Preston.—Year's Working.—We have received from Mr. J. F. Simpson, borough electrical engineer, a copy of the report and statement of accounts of the Electricity Department for the year ended March 31st last. The total revenue from the sales of electricity amounted to £256,548 and the total working expenditure was £130,256, leaving a gross profit of £126,292. The figures for the preceding year were: Income, £232,367; working expenses, £108,255; gross profit, £124,112. To the gross profit was added income from other sources making a total of £137,014 available. Interest and loan charges absorbed £128,360 and contribution to capital outlay £1,327, leaving a net surplus of £7,327, as against £18,035 in 1928-29. Revenue from the sale of fittings totalled £30,828 and there was a net surplus of £1,323. The capital expenditure during the year amounted to £199,473 and included £56,471 for generating plant and machinery, £46,185 for transmission lines and £33,760 for mains and services. The total now spent on the undertaking, including the assisted wiring scheme, is £1,763,115. The sales of electricity increased from 62,421,057 to 77,732,262 kWh and the maximum load from 21,000 to 24,000 kW. The average income per kWh sold fell from 0.927d. to 0.818d. During the year the Blackpool supply increased by 47 per cent., and that to the Lancashire Electric Power Co., by 14 per cent. The transmission lines of the Lytham St. Annes' supply will be completed, it is hoped, before the end of the current year; the supply to the Kirkham area was inaugurated in November last, the number of consumers at the end of March being 315. Progress on the works in connection with the grid system of the Central Electricity Board was delayed in consequence of various alterations in the scheme, but the details have now been settled and work has been commenced on the construction of the Board's sub-station adjoining the Ribble power station.

Extension of Supply Area.—The Town Council has decided to apply for a Special Order to supply electricity in numerous outlying areas.

Price Reductions.—Reductions in the charges for electricity have been made or recommended in the following districts:—

Norwich.—Domestic two-part tariff: "Unit" charge reduced from 1d. to ¾d. in Norwich and the fringe area, and from 1¼d. to 1d. in the added area.

Rawtenstall.—Power purposes: For consumers taking up to 3,000 kWh a month a reduction of ¼d. a kWh has been made on the first 2,500 kWh. The discount for prompt payment has been increased from 2½ to 5 per cent.

Mansfield.—Lighting flat rate: From 6d. to 5½d. per kWh. Prepayment meter supply: From 6½d. to 6d. per kWh. Maximum demand supplies: From 8d. and 2½d. to 8d. and 2d. per kWh. Power: From 1¼d. to 1d. per kWh.

Scarborough.—Prepayment Meters.—The Corporation Electricity Committee has resolved to install shilling-in-the-slot prepayment meters for electric lighting in all Corporation houses in place of existing arrangements. Some of these houses have hitherto had unlimited supplies at a fixed charge of 1s. per week collected with the rent.

Seaham Harbour.—Year's Working.—The third annual report on the working of the Urban District Council electricity undertaking (engineer and manager, Mr. Henry Adam) for the year ended March 31st last states that the total revenue for the year amounted to £10,768, as compared with £7,153 for the previous year. After providing for capital and other charges, there was a net surplus of £1,811, as compared with £1,426 in 1928-29. Sales of electricity rose from 309,673 to 502,232 kWh, while at March 31st there were 1,672 consumers, an increase of 713 during the year.

South Africa.—Electricity Schemes in Transvaal.—The Town Council of Benoni, Transvaal Province, has decided to modernise the electricity system at a cost of £33,700, so as to provide an adequate supply for domestic purposes. Approval has also been given by the ratepayers of Christiana to the carrying out of an electricity scheme which is estimated to cost about £12,000.

Southampton.—Year's Working.—The accounts of the Corporation Electricity Department (engineer: Mr. W. G. Turner) for the twelve months ended March 31st last show a total revenue of £274,458, a working expenditure of £164,032 and a gross profit of £110,426. The corresponding figures for the preceding year were: Income, £234,087; working expenses, £124,695; gross profit, £109,393. After providing for interest and loan redemption (£71,705) and special expenditure (£23,151), there was a net surplus of £15,570, as compared with £24,445 for the previous year. A sum of £10,000 was contributed to the general rate fund. Expenditure during the year on capital account amounted to £128,664, of which £93,808 was for mains and services; the total spent on the undertaking now stands at £1,240,541. Sales of electricity increased from 31,946,362 to 37,906,379 kWh, and the maximum supply demanded from 15,820 to 17,730 kW. Arrangements were made with the West Hampshire Electricity Co., Ltd., and the Winchester Corporation for bulk supplies, to enable them to supply electricity, respectively, in the rural district of Hursley, and in the parishes of Compton and Twyford. By this agreement the area of supply has been increased by approximately 37 sq. miles. The total area now to be supplied by the Corporation is approximately 256 sq. miles. The supply to Hamble was made available on April 17th, 1929.

Stoke-on-Trent.—Loan.—The Corporation Electricity Committee is applying for sanction to a loan of £20,000 for electricity services.

Mains Extensions.—The Corporation Electricity Committee is to extend mains to supply new schools, &c., at Meir, and the premises of the Dart Cash Carrier Co., Ltd., in Bagnall Street, at a total cost of £2,050.

Strood.—Extensions.—The Rural District Council has given its consent to the scheme of the Kent Electric Power Co., for a supply of electricity to Cliffe, Cliffe Village, and Meopham, and has approved the proposal of the Gravesend Corporation to extend its mains to Chalk.

United States.—Power Station Enlargements.—An addition of 75,000 kW has just been made to the electrical plant of Buffalo, N.Y., through the putting into service of the first of three new steam turbo-generators at the Charles R. Huntley station of the Buffalo General Electric Company. *Power* states that, when the other two machines are put into service, the station will have a total capacity of 466,000 kW and will be the largest in the entire Niagara-Hudson system.

Warrington.—Year's Working.—The accounts of the Corporation electricity undertaking (engineer: Mr. F. V. L. Mathias) for the year ended March 31st last showed an increase in the total revenue from £134,301 to £141,362. Working expenses amounted to £84,977, as compared with £77,315 in the preceding year, and there was a gross profit of £56,384 (£56,986), to which was added £1,168, interest on investments, and £1,019, bank interest, making a total of £58,571 available. After deducting interest on loans (£14,938), sinking fund contributions (£15,189), income tax (£6,463) and capital expenditure out of revenue (£2,117), there was a net surplus of £19,866, as compared with £18,464 in 1928-29. During the year the capital expenditure totalled £19,599, of which £17,482 was for mains and services; a total of £585,594 has now been spent on the undertaking. There was an increase in the electricity sold from 23,714,107 to 24,596,032 kWh, the maximum demand also rising from 10,200 to 10,600 kW. The average price obtained per kWh remained unchanged (1.27d.). The various schemes for hiring out electrical apparatus continued to meet with success, and very few private houses now fail to make use of electricity for purposes other than lighting in some form or another. Under the Department's hiring scheme some 4,564 pieces of domestic apparatus are connected to the mains, representing a load of 5,412 kW.

Whitworth.—Proposed Transfer of Electricity Undertaking.—A sub-committee has been appointed by the Urban District Council to negotiate with the Rochdale Corporation with a view to that body taking over Whitworth's electricity undertaking, if advantageous terms can be arranged.

Wigan.—Public Lighting.—The Rural District Council has decided to adopt electricity for public lighting at Parbold, and Wrightington. Electricity will be supplied by the Lancashire Electric Power Co.

Supply for Shevington.—Having taken a canvass to ascertain the desirability or otherwise of laying electric mains in Shevington, the Corporation has come to the conclusion that the enterprise would be justified.

Wimbledon.—Loans.—The Corporation Electricity Committee is applying for sanction to the borrowing of £50,000 for mains and house services; £7,000 for appliances for hiring; and £5,000 for the maximum-demand system wiring.

Proposed Street Lighting Improvements.—The Corporation has asked the electrical engineer to submit an alternative estimate for the substitution of central overhead lighting throughout the length of Parkside.

Wrexham.—Electricity Supply for Rural Area.—The Rural District Council has been informed by the Electricity Distribution of North Wales, Ltd., that work will be put in hand early next year to supply electricity by means of overhead lines to Brymbo, Broughton and Moss. The Council is to approach the company with regard to extending the scheme so as to supply other areas, including Bwlchgwyn.

Tramway and Railway Notes.

Canada.—Suggested Montreal "Underground."—According to Alderman J. Allan Bray, chairman of the Executive Committee of the Montreal Council, the municipal authorities may have to consider before long the question of facilitating rapid transit by tube railways. The subway question would, he thought, have to be taken up after some settlement had been arrived at with regard to the desired re-arrangement of the Canadian National Railway terminal plans. At the present time the city authorities were endeavouring to secure the consent of the Canadian National Railways to the elimination of elevated tracks from the terminal plans. The Montreal Tramways Company is stated to have submitted a proposal for the expenditure of $67,000,000 on the construction of long north-south and east-west underground railways.

Continental.—France.—Electric traction has been functioning regularly on the railway line between Chambery and Saint-Jean-de-Maurienne since last summer, and in the spring of this year its use was extended to Modane. The substitution of electric for steam locomotives on such an uneven mountain line as the Modane line has given interesting results. In the first place the service is more flexible. When they arrive late at the beginning of the electrified section, express and fast trains can make up on this section three times as many minutes as formerly and slow and goods trains twice as many, although the loads of the goods trains are already appreciably heavier. Moreover, owing to the quick starting and stopping, much less time is spent at the stations and the regularity of running is distinctly improved. As a result of the introduction of electric traction the number of locomotives necessary for the service has been reduced by about 12 per cent. During the winter new locomotives are to be put into use which will still further improve the service. In the course of trials which have just been carried out these new locomotives have drawn fast trains at a speed of 90 km. an hour with a greater weight than that of the trains drawn between Paris and Chambery by the most powerful steam engines. At full speed, 120 km. an hour has been easily maintained without exerting the locomotive to the maximum.—*Reuter's Trade Service* (Paris).

The second section of the electrically-operated cable railway with suspended cars which runs from Chamonix to the Brevent has recently been opened for traffic. The new section lies between the Planpraz Hotel and the top of the Brevent, and the train covers the distance in eight minutes. The first section from Chamonix to Planpraz was opened two years ago.

Belgium.—The work of electrification having been completed electric trains are now being run by the Société Nationale des Chemins de Fer Vicinaux between Mons, Nimy, and Marsières. Various other sections of the local railways in the Borinage and Mons districts are also being electrified.

Croydon.—Reconstruction of Track.—The Corporation Tramways Committee has obtained sanction to the borrowing of £3,500 for the construction of a double tramway track in High Street.

Edinburgh.—Uniform Traffic Signals.—The Corporation Watching Committee recommends the adoption of proposals by the Ministry of Transport regarding the uniformity of automatic traffic signals involving an extensive alteration of the city's system. The electricity manager has been asked to prepare a report as to the probable cost.

Salford.—Reconstruction of Track.—The City Council has been recommended to apply for sanction to a loan of £27,300 for the reconstruction of the tramway track in Bolton Road, Eccles New Road and Chapel Street.

Manchester.—Railless Cars.—With a view to considering the possibilities of the railless-car system, the Corporation Transport Committee has appointed a deputation to visit other towns, including Bradford and Wolverhampton, where the system is in operation.

Telegraph and Telephone Notes.

France.—NEW CABLE SHIP.—A new 3,915-ton cable-laying steamer known as "*l'Ampere*," for the submarine cable service of the French Post and Telegraph Authorities, was recently launched at La Cistat, near Bordeaux.

Radio-telephony.—SPEECH PRIVACY.—A wireless telephone conversation in which the spoken words were transformed to such a degree as to be completely unintelligible to illicit listeners and then so retransformed on reception as to be understood by the receiver, has been held between The Hague and the Dutch East Indies. The transformations of the words are done automatically, so that alteration of apparatus or wires is not necessary.—*Reuter* (The Hague).

Ships' Telephony Beacon.—CLYDE INSTALLATION.—The Clyde Lighthouse Trustees have decided, after a test of nearly a year, to install a permanent talking fog beacon in the Cumbrae lighthouse in the Firth of Clyde. The device is a combination of wireless telephony and foghorn, and is based on the fact that, while sound travels at a uniform and comparatively slow rate, wireless signals are practically instantaneous. When the foghorn of the Cumbrae lighthouse sounds the wireless telephone beside it at once begins to count one, two, three, the interval between the figures representing the length of time that sound takes to travel one mile. The wireless operator on the ship, hearing the count begin, listens for the foghorn; when he hears it he calculates from the last figure counted before its arrival and is thus able, with some approach to accuracy, to estimate the distance in miles between his ship and the lighthouse, thus avoiding judging the distance by ear alone. The Postmaster-General has granted a licence for the permanent establishment of the installation, which, with a number of duplicate parts, will cost between £500 and £600.

Italy.—TELEGRAPHY.—The Italian Post and Telegraph Authorities are at present carrying out some experiments with Creed automatic long-distance telegraph apparatus. The system has been in use for some time between Rome and Pisa, a distance of about 220 miles, and is stated to be giving very satisfactory results.

Radio Notes.

Italy.—LICENCES.—It is reported that on July 1st, 1930, the number of receiving licence-holders was 140,000, the large increase during the last eighteen months being attributed to the Government's "piracy repression" measures.

Sweden.—COMMON-WAVE STATIONS.—The State Telegraph Administration has asked the Government for about £8,000 in order to erect three broadcast stations in replacement of some old transmitters. It is intended to operate the new stations on the Swedish national wavelength of 231 metres (1,301 kc/sec), says *World-Radio*, and the Telegraph Administration purposes to replace successively nearly all the 23 relay stations in that country. The transmitters will be of an entirely new type, using no running machinery, and will be operated automatically, or semi-automatically, in order to reduce the running costs. The aerial power will be 330 watts. The Administration is of the opinion that the present international common waves, sooner or later, will be taken into use for exclusive waves. Thus, the step now taken is made in order to meet in advance decisions that may be agreed upon by future international conferences.

United States.—LAWSUITS.—Some 31 cases involving radio law, in which the Federal Radio Commission is directly interested, are pending before American courts. They are expected to be disposed of some time this winter, and their outcome will probably affect the course of the Commission's policy in the future, says *World-Radio*. Only two of the cases will reach the Supreme Court, and a constitutional issue is involved in both of them. The two stations concerned are WMBD-WOK and WCRW, both of Chicago, which were in operation before the enactment of the radio law of 1927, and the refusal of the Commission to renew their licences amounts, they allege, to deprivation of property in violation of the fifth amendment to the Constitution. Both stations claim to have lost large sums of money invested in them owing to the Commission's rulings. One of the other cases challenges the Commission's right to censor station programmes for indecent and obscene language by refusal to renew the licence. Other suits are based on the refusal of the Commission to grant an increase in power, denial of construction permits for proposed broadcasters, and orders requiring stations to change their wavelengths.

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the ELECTRICAL REVIEW containing the advertisement is given in parentheses below.

Contracts Open.

Australia.—MELBOURNE.—Posts and Telegraphs Department. October 14th. Condensers. (A.X. 10000.)*
November 18th. Telephone receivers, ebonite earpieces, &c. (A.X. 10183.)*
November 25th. Motor-generator sets. (A.X. 10184.)*

Belfast.—October 15th. Harbour Commissioners. Three electrically-driven pumps at Clarendon Graving Docks. Specifications, &c., from Mr. W. Y. Chamberlain, acting chief engineer, Harbour Office, Belfast. Tenders to Mr. M. J. Watkins, general manager and secretary, Harbour Office, Belfast.

Egypt.—ZAGAZIG.—October 15th. Municipal Council. Four 25-kVA single-phase transformers. (A.X. 10153.)*

Elie and Earlsferry.—October 6th. Burgh Council. Electrical work at housing scheme. Schedules, &c., from Mr. A. D. Haxton, architect, Commercial Road, Leven; tenders to Mr. A. M. Cook, town clerk.

Glasgow.—October 6th. Corporation. Electric lighting installation at Ruchill Hospital. Specifications, &c., from general manager, Electricity Department, 4, West Regent Street, Glasgow. Offers to town clerk.

Heston and Isleworth.—October 10th. Urban District Council. Electrically-propelled refuse collecting vehicles. (See this issue.)

India.—SIMLA.—October 13th. India Store Department. Power plant for the Wana power station. (A.X. 10262.)*

Lancaster.—Electricity Department. Transformers. (See this issue.)

Leyton.—October 31st. Town Council. Fifty tramcar bodies and trucks, with electrical equipment and magnetic track and wheel brake equipments, &c.; also one electrically-operated car traverser. (See this issue.)

Liverpool.—October 21st. Electricity Supply Department. Motor-generator sets. (See this issue.)

London. — CENTRAL ELECTRICITY BOARD. — October 20th. Metering equipment for certain stations in connection with the Mid-East England Electricity Scheme. (September 5th.)
October 13th. 132,000-V transformers for the North-East England Electricity Scheme. (September 12th.)
November 3rd. 132,000-V overhead transmission lines for the South-West England and South Wales Electricity Scheme. (September 26th.)
November 3rd. 132,000-V overhead transmission lines for the North-East England Electricity Scheme. (September 26th.)
November 3rd. Construction of site works, foundation works and buildings in the area of the Central England Electricity Scheme. (September 26th.)
OFFICE OF WORKS.—October 7th. Electric lift at the National Physical Laboratory, Teddington. (September 19th.)
October 10th. Electric wiring at Leonard Street Post Office, Shoreditch. (September 19th.)
COUNTY OF LONDON ELECTRIC SUPPLY CO., LTD.—October 24th. Two 75,000-kW c.m.r. turbo-alternators, circulating water screening plant, condensing plant and auxiliary apparatus, and overhead electric travelling cranes, in connection with Barking power station extensions. (September 19th.)
LONDON COUNTY COUNCIL.—October 13th. Wiring and fittings for electric lighting (1,375 points) in tenement dwellings at Glebe housing estate, Peckham. (September 26th.)
November 3rd. Two 20,000-kW turbo-alternators, condensing plant, &c. (September 26th.)
INDIA STORE DEPARTMENT.—October 10th. 18,800 inert cells.
October 15th. 20,000 negative elements for Leclanché cells. (September 26th.)

Manchester.—October 7th. Electricity Committee. Twelve months' supply of a.c. electric fan motors. Specification (No. 282) from Mr. H. C. Lamb, chief engineer and manager, Electricity Department, Town Hall.

Newcastle-upon-Tyne. — October 10th. Newcastle-upon-Tyne Electric Supply Co., Ltd. Steel frame buildings for power station; also 120-ton and 25-ton overhead electric travelling cranes. (August 29th.)

New Zealand.—Wellington.—Post and Telegraph Department. November 5th. Telephone transformers. (A.X. 10170.)*

November 4th. Telephone cable. (A.X. 10242.)*

November 20th. Telephone cordage. (A.X. 10243.)*

Smethwick.—October 31st. Education Committee. Electric lighting of the Uplands School. (September 26th.)

South Africa.—Cape Town.—October 16th. City Electricity Department. Electric cables. (A.X. 10162.)*

Pretoria.—November 21st. Department of Posts and Telegraphs. Dry cells and battery material. (A.X. 10244.)*

Durban.—October 24th. Corporation Electricity Department. Ten single-phase transformers. (A.X. 10277.)*

Stone.—October 15th. Electricity Department. Outdoor sub-station equipment and l.p. overhead and underground distribution networks. (See this issue.)

Turkey.—Ankara.—October 16th. Direction-General of Posts, Telegraphs and Telephones. Porcelain insulators and copper sleeves. (A.X. 10260).*

Uruguay.—Montevideo.—October 31st. Public Cleansing Department. 1,000-kW turbo-generator, switchgear, transformers and waste fuel boilers. (A.X. 10180.)*

October 31st. State Electricity Supply Works. Electricity meters and spares. (A.X. 10254.)*

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.

Contracts Closed.

Bexhill.—Electricity Committee. Recommended :—
Meters for six months (£1,267).—Edison Swan Electric Co., Ltd.
Accepted :—
Cable (£231).—W. T. Glover & Co., Ltd.
Feeder panel (£72).—Bertram Thomas.

Croydon.—Electricity Committee. Recommended :—
Modification of cubicles at power station (£5,742).—Metropolitan-Vickers Electrical Co., Ltd.
Warren master frequency meter.—Everett Edgecumbe and Co., Ltd.
Assistance Committee. Accepted :—
X-ray equipment at Mayday Road Hospital (£85).—W. D. Wilson.
Tramways Committee. Accepted :—
Tramway cross-over (£410).—Hadfields, Ltd.

Ilford.—General Purposes Committee. Accepted :—
Rotary transformer outfit and switchboard for baths (£154).—Crypto Electrical Co., Ltd.
Tramways Committee. Accepted :—
Trolley wire (9¾d. per lb.).—R. Johnson & Nephew, Ltd.
It is pointed out that owing to the abnormal fall in the price of raw copper this price is 3 9/16d. per lb. less than the price paid in January.

Leicester.—Tramways Committee. Accepted :—
Special trackwork (£3,465).—Hadfields, Ltd.

London.—Battersea.—Electricity Committee. Accepted :—
250-kVA transformer (£159).—British Electric Transformer Co., Ltd.
Two feeder panels at Lavender Hill sub-station (£600).—General Electric Co., Ltd.
Spare parts for 30,000-kW set (£415).—Fraser & Chalmers Engineering Works.
Switchgear (£165).—J. G. Statter & Co.

Nantwich.—Rural District Council. Accepted :—
Electrical work in houses being erected.—Carrington and Button.

Salford.—Electricity Committee. Recommended :—
Transformers for 12 months and busbar section equipment at Agecroft power station.—Metropolitan-Vickers Electrical Co., Ltd.

Smethwick.—Housing Committee. Accepted :—
Electric lighting at housing scheme.—Etna Lighting and Heating Co., Ltd.

South Africa.—Johannesburg.—City Council. Accepted :—
Electricity meters.—British General Electric Co., Ltd. (£1,530); Hubert Davies & Co., Ltd. (£1,166).
Insulated wire for twelve months from August 1st, 1930.—G. H. Langler & Co., Ltd.
Cape Town.—City Council. Accepted :—
Copper wire (£3,177).—British Insulated Cables, Ltd.
—*South African Engineer and Electrical Review.*

Stoke-on-Trent.—Assistance Committee. Accepted :—
Electric lighting installation at Hanley relief offices.—Blackburn, Starling & Co.

Wrexham.—Rural District Council. Accepted :—
Wiring of 170 houses (£1,187).—S. Thornton.

Forthcoming Events.

Association of Mining Electrical Engineers (South Wales Branch).—October 4th. South Wales Institute of Engineers, Cardiff. 6 p.m. Chairman's address.

British Electrical Development Association, Inc.—October 6th. Connaught Rooms, Great Queen Street, W.C. 12.45 for 1 p.m. Shop and Display Lighting Campaign luncheon for London and Home Counties area.

Institution of the Rubber Industry.—October 6th. Arts Theatre Club, Great Newport Street, W.C.2. 7.30 p.m. "The desirable properties of synthetic compositions for industrial purposes." Mr. W. D. Owen.

Society of Chemical Industry (Chemical Engineering Group).—October 6th. Institution of Civil Engineers, Great George Street, S.W.1. 8 p.m. "Recent results in structure research of colloids in science and industry." Dr. E. Hauser.

Institution of Electrical Engineers (Western Centre).—October 6th. University of Bristol. 6 p.m. Chairman's inaugural address. Mr. E. G. O'Kell.

Electrical Society of Glasgow.—October 7th. Reid's Smoke Room, 30, Gordon Street, Glasgow. 7.30 p.m. "Private generating plants." Mr. J. K. Gibbon.

Institution of Heating and Ventilating Engineers.—October 7th. Swedenborg Hall, 20, Hart Street, W.C.1. 7 p.m. "Power plant chimney pollution." Mr. G. L. Copping.

Illuminating Engineering Society.—October 8th. Lighting Service Bureau, 15, Savoy Street, Strand, W.C. 6.30 p.m. Report on progress in illuminating engineering and a display of exhibits illustrating recent developments in illumination.

Institution of Engineers-in-Charge.—October 8th. St. Bride Institute, Bride Lane, Fleet Street, E.C.4. 7.30 p.m. Presidential address, Mr. W. Reavell.

Television Society.—October 8th. University College, Gower Street, W.C.1. 7 p.m. "Some developments in television based on quantitative analysis." J. H. O. Harries.

Institute of Metals (London Local Section).—October 9th. Society of Motor Manufacturers and Traders, Ltd., 83, Pall Mall, S.W. 7.30 p.m. Chairman's address by Mr. W. T. Griffiths.

Institution of Welding Engineers.—October 9th. Engineers' Club, Albert Square, Manchester. 7.45 p.m. "The training of operators in the welding and cutting industries." Mr. J. Ryder.

Institute of Transport.—October 13th. Institution of Electrical Engineers, Savoy Place, Victoria Embankment, W.C. 5.30 p.m. Presidential address. Sir Arthur Stanley.

Institute of Marine Engineers.—October 14th. 85, The Minories, E.C. 6 p.m. "The design and manufacture of marine auxiliary oil engines." Mr. O. Wans.

Overhead Lines Association.—October 15th. Institution of Electrical Engineers, Savoy Place, Victoria Embankment, W.C. 5.30 p.m. Annual general meeting.

Electroplaters' and Depositors' Technical Society.—October 15th. Northampton Polytechnic Institute, St. John Street, Clerkenwell, E.C. 8.15 p.m. "Practical difficulties in the electrodeposition of chromium." Mr. J. W. Cuthbertson.

Motor Show.—London, Olympia. October 16th-25th.

Chemical Society.—October 16th. Burlington House, Piccadilly, W.1. 8 p.m. Unveiling the Perkin Plaque.

Faraday House Old Students' Association.—October 17th. Savoy Hotel, Strand, W.C. 6.30 for 7 p.m. Annual dinner.

Association of Supervising Electrical Engineers.—October 21st. Junior Institution of Engineers, 39, Victoria Street, S.W. 7.15 p.m. Presidential address. Mr. S. B. Donkin.

Institute of Fuel.—October 22nd and 23rd. Institution of Electrical Engineers, Savoy Place, Victoria Embankment, W.C. Annual conference. October 22nd. Connaught Rooms, Great Queen Street, W.C.2. 6.45 p.m. Annual dinner.

The "Electrical Review" Service Department.

INQUIRIES must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of makers of the following devices:—

A correspondent desires to get in touch with two old friends, Mr. L. Arnold and Mr. T. Hughes, at one time pupils at Redditch.

HARDIE exterior flood lamps.

Notes.

The Benevolent Fund Festival.

Mr. R. A. Chattock, who is throwing the whole of his most attractive personality and widespreading influence into the interests of the Electrical Trades Benevolent Institution as president for the year 1930, has issued an appeal to the industry and all associated with it, in connection with the Annual Festival which is to take place at the Savoy Hotel on November 12th. He asks everybody to support him at the dinner and dance, by making this year's collection a bumper one. Pointing out that the calls upon the Fund are growing every year, Mr. Chattock is anxious to secure an even larger sum than was secured by his predecessor (£9,334). Though the electrical industry is always growing, and during recent years has been one of the least depressed, the fact remains that during the past four years the claims upon the Fund have increased no less than four-fold! and many of the claimants are men who were once "considered rich," but have unexpectedly been reduced to dire straits. The President asks for some to come forward as donors of handsome sums, and he calls for a large increase in members for the new Associate class (5s. per annum). Please address your donations and promises to Mr. R. A. Chattock, President, or to Captain J. T. Keeping, M.C., Secretary, at 9, Southampton Street, Holborn, London, W.C.1.

The President of the International Electrotechnical Commission.

The presence in England of Dr. Axel F. Enstrom was made the occasion of an informal luncheon given in his honour by the British Engineering Standards Association on Monday last at the Royal Automobile Club. Dr. Enstrom, who was elected by acclamation as president of the International Electrotechnical Commission last July, was, it will be remembered, president of the Swedish Committee whose splendidly organised hospitality did so much towards the success of the I.E.C. plenary meeting in Scandinavia during the past summer (ELECTRICAL REVIEW, July 25th, and August 1st and 8th, 1930).

Dr. Enstrom is director of the Royal Institution of Scientific and Industrial Research, Sweden, and has travelled widely; all who have had the privilege of meeting him will appreciate how valuable his breadth of view and liberal outlook on life must be to the I.E.C. during its next four years under his guidance. The B.E.S.A. provides the British Committee of the I.E.C. Mr. C. P. Sparks, chairman of this committee, was unavoidably absent from the gathering, which included representative electrical engineers and physicists, and others interested in standardisation. Mr. C. le Maistre, C.B.E. (secretary), having welcomed Dr. Enstrom on behalf of all those interested in the work of the B.E.S.A., the health of the guest was proposed by Mr. Maurice F. G. Wilson (chairman). Dr. Enstrom briefly responded in the fluent and clear English which his fellow-countrymen seem so easily to acquire.

Chicago Underwriters.

We have received the following communication since our "Correspondence" Section was closed:—

"Included in the B.B.C. general news announcement on Saturday night was the following:

'President Hoover has signed a proclamation which designates the week begining October 5th as a National Fire Prevention Week. The President calls attention to the fact that the fire losses in the U.S. of America in 1929 amounted to £94,000,000, and he asks his fellow countrymen to co-operate actively in the prevention of fire. He says that at present the North American Continent *leads the world in the amount of its annual fire waste.*'

"It is not a particularly flattering testimonial to the Chicago Underwriters or their standards, and should encourage a movement for organised publicity for British standards and practice in affected overseas countries.

T. R. MARTIN."

Birmingham, *September 29th*, 1930.

Electrical Society of Glasgow.

The syllabus for the 1930-31 session shows that on October 7th Mr. J. K. Gibbon will deal with "Private Generating Plant"; on November 4th Mr. W. J. Jones will discuss "Electrical Illumination as an Engineering Problem," and on December 2nd Mr. L. M. Tye's paper will be on "Illumination Engineering: its Practical Application." Next year there will be a visit to the works of the Craigpark Electric Cable Co., Ltd., at Springburn on January 14th, and Mr. H. S. Hind will explain the "Production and Reproduction of Talking Motion Pictures" on February 3rd. The annual general meeting will be on March 3rd.

O.L.A. Supper-dance.

The Overhead Lines Association's conversazione and supper-dance will take place on Friday, October 31st, at Messrs. Harrods, London, 8 p.m. to 1 a.m. Tickets (12s. 6d. each, including supper) are obtainable from the members of the entertainment committee: Messrs. J. H. C. Brooking, Croydon Cable Works, Ltd., Mitcham Road, Croydon; R. Borlase Matthews, Greater Felcourt, East Grinstead; and G. Molle, 146, Bishopsgate, E.C.2 (telephone, Bishopsgate 1120) to whom early application should be made. A number of exhibits will be on view relating to overhead lines and allied matters; all communications regarding the arrangement of them should be made to Mr. G. Molle at the above address.

Midland Electrical Engineers' Ball.

The Annual Ball of the Midland Electrical Engineers will again be held at the Grand Hotel, Birmingham, on Friday, November 14th, under the presidency of Mr. S. T. Allen, Central England District Engineer, Central Electricity Board, Birmingham. The chairman of the committee is Mr. W. H. Heaton, and the hon. secretary, Mr. W. Y. Anderson, 14, Dale End, Birmingham.

Rugby Radio Station Visit.

On Tuesday last, September 30th, Colonel Sir Thomas F. Purves, engineer-in-chief of the General Post Office and the retiring president of the Institution of Electrical Engineers, conducted members of the I.E.E. Council and their ladies on a visit of inspection to the Government radio telegraphy and telephony transmitting station at Rugby. The party travelled from London by train, luncheon being served on the outward trip and tea during the home journey.

The Swan Memorial.

A well-attended meeting was held in Sunderland on September 23rd, to consider the proposed memorial to Sir Joseph Wilson Swan, concerning which a preliminary notice was given in the ELECTRICAL REVIEW of July 11th last. Alderman J. S. Nicholson, J.P., was in the chair, and Mr. B. A. Robinson, M.I.E.E., A.M.I.Mech.E., and Mr. W. T. MacColl, M.Sc., M.I.E.E., represented the Institution of Electrical Engineers. Mr. Alfred Smith, M.P., was also present.

The Institution's offer of a tablet, which is to be placed in the Sunderland Central Public Library Museum and Art Gallery, was accepted. It was agreed that Sir Joseph's discoveries in the sphere of photography should be mentioned both on the tablet and in connection with the appeal for funds to provide Swan Memorial scholarships in electrical science. It was also agreed that the I.E.E. should administer the scholarships. The honorary secretary of the Sunderland Committee is Mr. Stanley Pfob.

Society of Chemical Industry.

At the opening meeting on October 6th of the chemical engineering group of the Society, Dr. E. Hauser, of Frankfort, described "Recent results in structure research of colloids in science and industry." On November 14th the Carville station of the Newcastle-upon-Tyne Electric Supply Co., Ltd., is to be visited, and a paper is to be read by Mr. W. S. Coates on "Caustic embrittlement."

Appointments Vacant.

Assistant testing engineer for a London electric supply undertaking.

General assistant and foreman for the Marple Electricity Department.

Meter mechanic and tester, also linesman-jointer, for the Worksop Urban District Council.

Meter repairer and tester for the Aberdare Urban District Council.

Two meter repairers for a London borough.

(See our advertisement pages to-day.)

The Television Society.

The Society, of which Sir Ambrose Fleming is president and Dr. C. Tierney chairman of the Executive Committee, commences its third session with a lecture on October 8th. It has recently been granted a certificate of incorporation by the Board of Trade, and a research committee has been appointed to co-ordinate the work of individual members. Commencing with the opening meeting, printed reports of each lecture or meeting will appear in the *Proceedings* of the Society, which will be published and distributed to Fellows and Associates three times a year. The growth in membership is indicated by the following figures: at January 1st, 1929, 325; at January 1st, 1930, 577; present (September, 1930), 650.

Fatality.

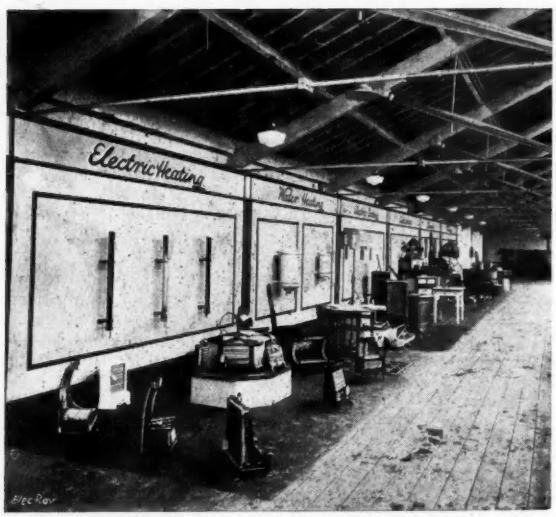
Two children, Colin D. Rae (aged 8) and Iris Syrett (aged 9) were found dead beside a conductor rail on the Southern Railway on September 27th at Isleworth, Middlesex. They climbed a fence and came into contact with the "live" rail.

Electrical Development in India.

The demand for power has so far outstripped the supply in the hill station of Darjeeling, in Bengal, that ways and means are being considered for replacing the obsolete machinery in the hydro-electric works of the municipality by modern machinery. In view of the growth of the hill station in popularity, and its expansion, the present capacity of the municipal plant (1,000 kW) has proved totally inadequate, and, in addition, the shortage of water for driving the turbines has raised the problem of the type of power house—thermal- or hydro-electric—most suited to the rapidly developing town. Another town in Bengal where new machinery for a power house is needed is Chittagong. The Chittagong Engineering and Electric Supply Co., Ltd., is now receiving a bulk supply from the power house of the Assam Bengal Railway, but it finds the demand for power sufficiently progressive to justify its consideration of the erection of its own generating station. The port of Chittagong is likely to show a larger volume of trade passing through it when some of the many railway projects, including the railway between Burma and India, have been completed. Besides the railway workshops, other industries show signs of development, and the population is increasing. The number of electricity consumers has risen by 30 per cent. within one year.

Electrical Exhibit at Flower Show.

The accompanying illustration is a view of the City of Birmingham Electric Supply Department's exhibit at the *Birmingham Gazette* Flower Show, which was held in Birmingham on September 4th, 5th, and 6th. The display included



Birmingham Electric Supply Department Exhibit.

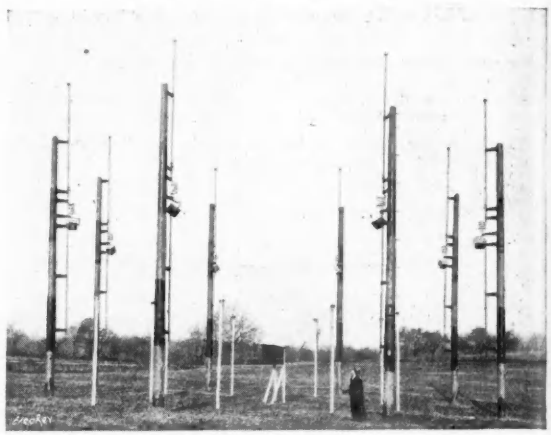
samples of new-pattern electric fires and heating apparatus, water heaters, cookers, washing machines and boilers, vacuum cleaners, lighting fittings, irons, kettles, toasters, and other modern labour-saving appliances.

Electro-cardiogram Interpretation.

The Medical Research Council has issued a report by Dr. W. H. Craib on electro-cardiogram interpretation (Special Report, Series No. 147, H.M. Stationery Office, price 1s. 3d.). It is a record of the results of an investigation of the principles underlying the interpretation of the electrical responses of muscle and nerve, carried out at University College Hospital Medical School, London.

Improved Radio Transmitter Aerial.

The Westinghouse Electric Company will have at its new transmitter (KDKA) near Saxonburg, Pennsylvania, U.S.A., an antenna which is expected to overcome one of the major obstacles of high-power broadcasting, as it has been designed to avoid "blanketing" the surrounding territory, yet it will send out powerful signals to distant points. In this way receiving sets near the station will be able to tune in distant programmes, despite the fact that they are within short range of an antenna which is radiating strong signals. The new antenna is being developed by Dr. Frank Conrad, the company's assistant chief engineer. At Saxon-



New Westinghouse Aerial in America.

burg an experimental short-wave set has been established with eight vertical antennæ set in a small circle (see accompanying illustration), the position of each pole being established accurately in advance. The effect is that the horizontal signal from each vertical antenna is absorbed, or "blocked off," by the signals from another. Thus, only a small amount of signal escapes along the ground, and the greatest signal force is skyward to the Heaviside layer, whence it is deflected outside the station's immediate vicinity. The KDKA antenna will form a large circle of wooden poles bearing a bird-cage aerial, 800 ft. in diameter with poles 110 ft. in height. The points on the antenna from which the signals will emanate will be so placed in the radiation pattern that the desired cancelling of strength effected will result.

Nottingham Society of Engineers.

A lecture on "The Application of X-rays to Industry" is being delivered this evening by Mr. C. Norman Kemp and the Lincoln Engineering Society has invited members to a conversazione and exhibition of engineering objects in the Drill Hall, Lincoln, on October 8th. The annual general meeting is to take place on October 13th.

Institution Notes.

Institution of Electrical Engineers.

Faraday Lecture.—This special lecture will be delivered at the various Centres during the 1930-31 session by Prof. W. Cramp, D.Sc., who has chosen "The Birth of Electrical Engineering" as his subject.

South-Midland Centre.—Mr. G. Rogers, chairman, will deliver his address at Birmingham on October 15th. During the evening the premiums awarded to local members for papers read last session will be presented.

Mersey & North Wales (Liverpool) Centre.—Mr. A. J. Pratt, chairman, will deliver his address on October 20th, illustrated with a kinematograph film; his subject will be "The development of the telephone system." On November 3rd the Billingham steam and electric plant of I.C.I., Ltd., will be described and on November 17th Mr. J. J. Denton will discuss "Television."

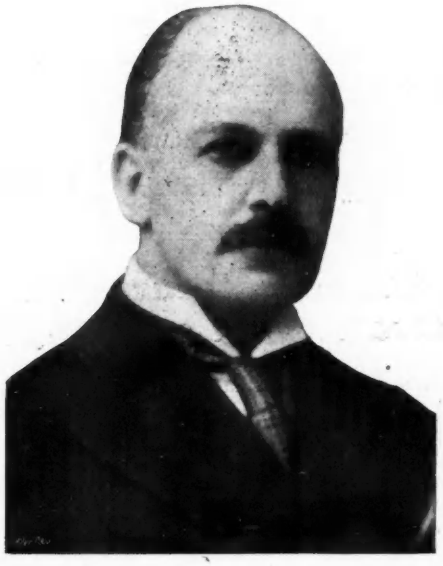
Institution of Heating and Ventilating Engineers.

On November 1st the London Power Co.'s Willesden generating station is to be visited, and on November 5th Mr. T. G. N. Haldane will describe his heat pump and its application to swimming-bath heating. On December 3rd Mr. E. G. Phillips is to discuss the cost of operating industrial and private electricity generating sets in comparison with public supplies. Next year the subjects to be discussed will include radiant, panel, and concealed floor heating, water heating, and domestic hot-water supply.

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.

Mr. Edwin Seddon, engineer and manager of the Edinburgh Electricity Department, whose portrait accompanies this note, is the 1930-31 chairman of the Scottish Centre of the Institution of Electrical Engineers. Mr. Seddon served his apprenticeship with Messrs. Turner, Atherton & Co., Denton, Manchester, and received his technical training at the Ashton-under-Lyne Technical Institute. After serving as a junior engineer in the Blackpool Corporation Tramways and Electricity Departments, he went to the Hanley municipal electricity works, and from there to Eastbourne. From 1912 to



Jas. Bacon & Sons] *[Edinburgh.*

Mr. E. Seddon.

Chairman of the Scottish Centre of the I.E.E.

1920 he was with the West Ham Electricity Department and then he became chief assistant engineer to the Edinburgh Corporation Electricity Department under Mr. F. A. Newington. When the latter resigned in 1924 Mr. Seddon succeeded him. Since his occupancy of the position the Edinburgh undertaking has made considerable progress, the output increasing by over 113 per cent. The principal development has been the supersession of a number of small scattered plants by the up-to-date Portobello station which serves a wide area in the Lothians. In addition to his membership of the I.E.E. he is a member of the Institution of Mechanical Engineers.

We are informed by the Brush Electrical Engineering Co., Ltd., that the following directorial and managerial rearrangements have been decided on with a view to meeting present-day industrial needs and to give additional effect to the co-partnership principles now in force. **Mr. W. Johnstone,** by his own desire, will relinquish his appointment as managing director, remaining, however, on the board and undertaking other important duties, with residence in London. **Mr. A. T. Brotherton** has been appointed a member of the board with special duties as local director at Loughborough. **Mr. W. Pearson,** who has been for many years with the company, has been appointed general manager of the company. **Mr. E. Garcke** has agreed to serve the company for another year and to assume the title and duties of chairman and managing director.

Mr. A. E. McKenzie, borough electrical engineer of Wimbledon, has come to an agreement with the Joint Staffing and Electricity Committees which provides that if the net profits of the electricity undertaking during the financial year 1930-31, or either of the following three financial years, exceed the sum of £2,000, he shall be paid a bonus of 2½ per cent. on all net profits in excess of that figure. The current charges for supply are to be the basis upon which these profits will be computed.

Mr. Walter B. Jones, chairman of the United Steel Companies, has been appointed to the board of the Yorkshire Electric Power Co.

Mr. H. de C. Falle, O.B.E. (Mil.), A.M.I.E.E., has joined the sales staff of Laurence Scott & Electromotors, Ltd., and will shortly be taking up his new duties at their London office, Australia House. Mr. Falle recently resigned his position with Ruths Steam Storage, Ltd.; prior to this he was for a number of years with the General Electric Co., Ltd.

Mr. Forbes Mackay, the general manager of the Sydney (N.S.W.) Municipal Electricity Department, has been granted an increase of £1,000 in his salary, raising it to £3,000 per annum. The Sydney Press, in reporting this, states that while Mr. Forbes Mackay was in England recently he received an allowance of £3 a day, and while he was supervisor of the work at Bunnerong power station he received an extra £1,000 a year, which was later increased to £1,500 a year.

Mr. W. J. Bache, the borough electrical engineer of Cheltenham, has completed 25 years' service in that position and to mark the event he was presented on September 28th with a silver cigarette box by the Electricity Committee and a silver teapot by the staff of the undertaking.

Mr. G. W. Briggs, superintendent of power stations to the Newcastle-upon-Tyne Electric Supply Co., Ltd., is retiring from that position after 41 years' service with the company. Upon his retirement the directors have presented him with a cheque and a clock; the staff has given him a console model all-mains radio receiver; and Messrs. Merz & McLellan an inlaid cigar cabinet. The function was held on September 26th when the presentations were made by Mr. R. P. Sloan (managing director), Mr. H. A. Couves, and Mr. C. H. Merz. Mr. Briggs has had the supervision of 14 stations.

Mr. Evelyn Fawssett is the chairman of the Meter and Instrument Section of the Institution of Electrical Engineers for the 1930-31 session. Mr. Fawssett, whose portrait appears herewith, was born in 1879, his father being Lt.-Col. Fawssett, of Louth, Lincs. He was educated at the King Edward VI school in that town and later proceeded to the City and Guilds Institute, South Kensington, at the time when Mr. A. H. Allen, the late technical editor of the Electrical Review, was

Elliott & Fry] *[London.*

Mr. E. Fawssett.

Chairman of the Meter and Instrument Section of the I.E.E.

on the staff. He took a high position in the class lists and spent a fourth year in experimental work. After two years at the Croydon Corporation electricity works, he joined the staff of the Newcastle-upon-Tyne Electric Supply Co., Ltd., as testing engineer, and has seen that organisation grow from small beginnings to its present dominating proportions. Mr. Fawssett is an active member of several committees of the British Engineering Standards Association and the Electrical Research Association, and has patented many improvements and developments in electrical measurement. He is to deliver his address as chairman of the Section early in November.

Mr. Alan L. Keet, chief engineer and general manager of the Exeter Corporation Electricity Department, who was formerly with the Northampton Electric Light & Power Co., Ltd., was married on September 25th to Miss Kathleen Palmer, of Dallington. He received a silver salver from the staff of the Exeter electricity undertaking.

Mr. Victor Watlington has resigned his appointment as managing director of the English Electric Co., Ltd., but is remaining on the board of the company. **Mr. G. H. Nelson,** has joined the English Electric board and is succeeding Mr. Watlington as managing director. Mr. Nelson is at present with the Metropolitan-Vickers Electrical Co., Ltd.

Miss R. A. Bellamy informs us that she has left the electric heating and cooking department of the British Electric Transformer Co., Ltd., to become secretary and showroom manager to the Manor Electric Oven & Fire Co., London.

Mr. G. E. Jesson, Associate I.E.E., is recommended for the position of power and heating sales engineer by the Poplar Electricity Committee at a salary of £417 per annum. Mr. Jesson was engaged for some time supervising electrical installation work for Messrs. Griggs & Son, Westminster.

Obituary.

Lord Birkenhead.—We regret to record the death of the Earl of Birkenhead, who relinquished politics in 1928 to become chairman of the Greater London and Counties Trust, Ltd.

Mr. W. D. Baldwin.—*The Times* records that Mr. W. D. Baldwin, chairman of the Otis Elevator Company and vice-president of Waygood-Otis, Ltd., London, died in New York on September 26th.

Financial Section.

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares.

New Companies Registered.

Stanalite Controls, Ltd.—Private company. Registered September 20th. Capital, £550 in £1 shares. Objects: To carry on the business of manufacturers and salesmen of an article now in process of being patented under No. 36,618, described as a capacity recorder, and to carry on the business of electrical and radio engineers, manufacturers of and dealers in electrical, magnetic, galvanic, and mechanical apparatus, &c. The directors are: A. Stanworth, "Springwood," Blacko, near Nelson; C. P. Stanworth, "Springwood," Blacko, near Nelson; W. E. Dixon, 50, Dugdale Road, Burnley; G. G. Warwick, 8, Brooklands Road, Burnley; H. G. W. Cooper, 32, Colne Road, Burnley. Secretary: W. J. G. Cooper, 24, Talbot Road, Blackpool. Registered office: 8, Ormerod Street, Burnley.

R.C. Radio-Electric, Ltd.—Private company. Registered September 22nd. Capital, £100 in £1 shares. Objects: To carry on business as radio engineers, manufacturers of and dealers in electric accumulators and batteries, wireless aerials, cabinets, dials, &c. The subscribers are: W. A. Sanders, 1a, Colworth Road, Leytonstone, E.11; Olive Daw, 54, Atherfold Road, Clapham, S.W.4. Solicitor: J. M. Hawkins, 22, Great James Street, Bedford Row, W.C.1.

Elsco Installations, Ltd.—Private company. Registered September 26th. Capital, £1,000 in £1 shares. Objects: To acquire the undertaking of the Electrical Service Company from H. M. Russell, and to carry on the business of electricians, electrical engineers, manufacturers of and dealers in dynamos, motors, electric light fittings, cooking apparatus, &c. The first directors are: H. M. Russell, 19, Windermere Avenue, Brondesbury, N.W.6, electrical engineer; Mrs. Edith E. M. Russell, 19, Windermere Avenue, Brondesbury, N.W.6. Registered office: 49, Lonsdale Road, N.W.6.

Wanstead Electric, Ltd.—Private company. Registered September 26th. Capital, £500 in £1 shares. Objects: To acquire the business of electricians, heretofore carried on at 143, High Street, Wanstead, and elsewhere as Biggs & Smith, and to accept a proposal in writing dated September 22nd made by H. M. Harmer. The first directors are: H. M. Harmer, 39, Hoe Street, Walthamstow, E.17, wireless engineer (managing director); L. S. Bristow, "St. Elmo," Spring Grove, Loughton, wireless engineer. Registered office: 143, High Street, Wanstead.

Quikheat Electrical Co., Ltd.—Private company. Registered September 23rd. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in electric fires, stoves, cookers and heaters of all kinds, &c. The subscribers are: D'Arcy F. Cubitt, Amberley House, Norfolk Street, W.C.2, and Alexander J. Wheatland, 40, Ashley Road, Thornton Heath, cashiers. Solicitors: Bulcraig and Davis, Amberley House, Norfolk Street, W.C.2.

Batwin Electrical Appliances, Ltd.—Private company. Registered September 25th. Capital, £500 in £1 shares. Objects: To carry on the business of electricians, manufacturers of and dealers in electrical and scientific appliances and particularly electrical exercising machines and appliances, and to acquire from Power Contracts (Batwin), Ltd., the right or licence to use the trade mark "Batwin." H. Constead, 20, Oakfields Road, Golders Green, N.W.11 (managing director of Power Contracts (Batwin), Ltd.) is the first director and chairman. Secretary: S. H. Sidders. Registered office: 138, Southwark Street, S.E.1.

Official Returns of Electrical Companies.

Sheerness and District Electric Supply Co., Ltd.—Capital, £75,000 in £1 shares. Return dated June 17th, 1930. All shares taken up. £75,000 paid. Mortgages and charges, nil.

Newquay Electric Light and Power Co., Ltd.—Capital, £50,000 in £1 shares. Return dated April 24th, 1930. 45,000 shares taken up. £34,820 paid. £10,180 considered as paid. Mortgages and charges, nil.

Rhondda Tramways Electric Supply Co., Ltd.—Capital, £100 in £1 shares. Return dated July 24th, 1930. 7 shares taken up. £7 paid. Mortgages and charges, £54,000.

Electricity Distribution of North Wales and District, Ltd.—Capital, £205,500 in 200,000 preference shares of £1 and 110,000 ordinary shares of 1s. each. Return dated May 19th, 1930. All shares issued and fully paid up. Mortgages and charges, £147,060.

Yorkshire Electric Transformer Co., Ltd.—Capital, £5,000 in £1 shares. Return dated June 23rd, 1930. 4,430 shares taken up. £4,430 paid. Mortgages and charges, nil.

Radiocraft Supplies, Ltd.—Capital, £3,500 in £1 shares. Return dated April 16th, 1930. 2,502 shares taken up. £752 paid. £1,750 considered as paid. Mortgages and charges, £500.

Electric and General Industrial Trusts, Ltd.—Issue on September 22nd, 1930, of £1,000 debentures, part of a series already registered.

Austin Welding Co., Ltd.—Particulars filed of £1,000 debentures authorised September 15th, 1930, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

City Notes.

Companies to be Struck Off the Register.

The names of the undermentioned companies will be struck off the register at the expiration of three months unless cause is shown to the contrary:—

Accumulator Charging Co., Ltd.
Aleon Radio Products, Ltd.
Defiance Electrical Co., Ltd.
Racon Electrical Co., Ltd.
Tidal Power Syndicate, Ltd.
Tudoradio Co., Ltd.
"Thermionics," Ltd.
Drycel, Ltd.
Halstead Electric Supply Co., Ltd.
Paramount Wireless Co., Ltd.
W. & M. Wireless Co., Ltd.
Wireless Generators, Ltd.

British Columbia Power Corporation.

The report for the year ended June 30th last states that the gross revenues of the company and its subsidiaries amounted to $15,434,341. Expenses, &c., totalled $11,144,434, leaving a net revenue of $4,289,906. After meeting bond interest, preference dividends and dividends on class "A" shares there is a surplus of $188,194. The total capital stock and surpluses now amount to $66,391,722. Expenditure made in increasing the capacity of plants and providing extensions and improvements during the year amounted to $9,379,050. The electrical energy sold increased from 342,627,810 kWh to 351,047,572 kWh, and the consumers from 105,908 to 110,436.

International Hydro-Electric System.

The directors have declared a quarterly dividend of 87½ cents on the preferred stock-convertible $3.50 series, as well as on the preferred stock-convertible $3.50 series as represented by its interim certificates. A stock dividend is also declared of 1/50th of a share of class A stock for each share of such class A stock held. Shareholders are to have the option of taking in lieu of stock, cash at the rate of 50 c. for each share so held.

Yorkshire Electric Power Co.

An extraordinary meeting of shareholders has been called for October 7th for the purpose of considering a resolution authorising the creation and issue of £2,000,000 of 5 per cent. redeemable debenture stock. Part of this is to be employed in the conversion or repayment of the existing £550,000 of 5½ per cent. debenture stock.

Scottish Power Co., Ltd.

At an extraordinary general meeting held on September 26th, shareholders were informed of the arrangements which had been concluded to acquire the issued share capital of the Scottish Southern Electric Supply Co., and a resolution was approved providing for the increase of the share capital by £200,000 to effect the exchange of shares.

Associated Fire Alarms, Ltd.

The profit for the year to June 30th last was £5,542, less income tax paid and reserved. The balance available (brought forward £1,694) is £5,938, from which it is proposed to place to reserve £1,000, and to pay a dividend of 8 per cent., leaving £1,392 to be carried forward.

General Electric Co., Ltd.

It is stated that applications for a total amount of £2,000,000 of the company's recently-issued debenture stock were made by holders of the existing 7 per cent. stock. Cash applicants applied for about £6,000,000 worth of stock. £3,500,000 of stock was offered.

Associated Gas & Electric.

The regular quarterly dividend has been declared on class "A" stock of 50 cents per share, payable November 1st, in class "A" stock at the rate of 1/40th of one share of class "A" stock for each share held.

Erinoid, Ltd.

The net profits for the eleven months ended July 31st last amounted to £16,695, but consideration of the dividend has been deferred owing to the uncertain outlook at home and abroad.

A. Reyrolle & Co., Ltd.

A resolution providing for the raising of the capital to £700,000 by the creation of 200,000 shares of £1 each was passed at a special meeting held on Tuesday last.

Bruce Peebles & Co., Ltd.

The directors have decided not to pay an interim dividend on the 7½ per cent. cumulative participating preference shares.

Midland Counties Electric Supply Co., Ltd.

The directors have declared an interim dividend of 2½ per cent., less tax.

West London & Provincial Electric & General Trust.

An interim dividend of 4½ per cent. has been declared on the ordinary stock.

French Companies.

The *Société Générale de Constructions Electriques et Mécaniques* (*Alsthom*), which was formed about two years ago by the amalgamation of most of the electrical departments of the French Thomson-Houston Company and the Société Alsacienne de Constructions Mécaniques, has issued its first accounts which cover a period of 18 months. The profits for this period amount to 57,122,000 fr., of which 40 millions has been written off for depreciation, 12 millions placed to reserve funds, and the balance carried forward.

The *Compagnie d'Entreprises Electro-Mécaniques* has decided to reduce its share capital from 10,000,000 fr. to 5,000,000 fr. in connection with the loss of 4,944,000 fr. in the year 1929-30.

The *Compagnie Française Thomson-Houston*, of Paris, has recently increased its capital from £2,640,000 to £3,520,000.

Stocks and Shares.

Tuesday Evening.

Financial conditions show little inclination to variation in spite of the fact that the holiday season is over, the children are back at school, and the industrial machine is assumed to be once more in full running order. The New York Stock Exchange is still something of a thorn in the flesh of the money markets on this side, in that its prices have lately taken on an unpleasant habit of giving way violently. Although upward reaction invariably occurs, the full extent of the previous fall is not recovered, and the impression remains that all is not well in the United States. In the circumstances, money continues to find its principal employment in the gilt-edged securities, of which the electrical department offers various examples, and the prices of all such stocks exhibit a rising tendency, because of the pressure to buy the "safety-first" securities in lieu of the more speculative industrial and similar issues.

A String of Rises.

An all-round rise has occurred in the prices of the debenture stocks of the well-known electricity supply companies. Some of these prices have not moved for months past. It is difficult, indeed, to gauge the market, owing to the scarcity of supply, and in recognition of this latter factor, quotations have been advanced during the past two or three days to the extent of one or two points. Amongst these improvements may be mentioned Central Electric 4 per cent. guaranteed, 97½; Charing Cross 4 per cent. and 4½ per cent. debentures, 79½ and 91½, respectively; Folkestone 4½ per cent. debenture, 90. Kensington & Knightsbridge 4 per cent., and South Metropolitan 4½ per cent. debentures are both better at 97½. London Electric debentures strengthened to 98½, and Midland Counties debentures to 96½. The newly-issued debenture stocks are also good, Edmundsons' Electricity at 3 premium, Newcastle at 5½ premium.

The 5 per cent. debenture issue of the General Electric Co., Ltd., was subscribed several times over, but as the holders of the existing 7 per cent. debenture stock had the right, up to Monday in this week, of converting into the new security, the allotment letters were not to be posted until Wednesday at the earliest. Dealings will therefore begin at the end of this week, assuming that the allotment letters are in the hands of subscribers by then. Expectation of the opening price suggests a possible premium of about 5s. per cent.

Gilt-edged Stocks.

County of London Electric Supply Company has an issue of 7 per cent. redeemable debenture stock, to which attention was drawn here last week as being redeemable on or after April next year at 100. It is thought to be practically certain that the company will retire this issue in the same manner as the General Electric has done in regard to its own 7 per cent. stock, and that in the near future the County of London Co. will offer to pay off the 7 per cent. stock, or give, as an alternative, some other security into which the present holders can exchange. The County Company has already an issue of 5 per cent. debenture stock, the price of which is quoted at 102½, with interest in June and December. The quotation carries, it will be seen, four months' interest in the present price, and this reduces the latter to, say, the equivalent of 101¼ ex dividend. Central Electricity 5 per cent. 1950-1970 can be bought at 101, but is no longer free of stamp and fee. North Metropolitan Power 5 per cent. second debenture costs 100.

Electricity Supply Shares.

Midland Electric Power Corporation shares have strengthened to 50s. 9d., showing an improvement of the pence. Midland Counties are dull at 28s.; the company is about to pay an interim dividend of 2½ per cent. actual. Previously, the Midland Counties has elected to pay its dividend once a year, and for 1929, 7 per cent. was distributed, against 6½ per cent. for 1928. In the interim distribution of 2½ per cent. there participate 250,000 of the new shares which were issued last December. It may be recalled that the company has powers to issue half a million new shares, to which proprietors gave their consent six months ago. The Yorkshire Electric Power Company, the price of whose ordinary shares stands at 31s. 3d., yielding, at that price, £5 2s. 5d. per cent. on the money, seeks authority to create and issue £2,000,000 in 5 per cent. debenture stock, redeemable at par in May, 1971, or earlier. It is anticipated that the stock will be offered at 97½ or thereabouts. The money will be used partly in repaying the company's 5½ per cent. debentures, of which there is at present outstanding £550,000. Scottish Power new ordinary stand at 3d. premium. A meeting was held in Edinburgh at the end of last week, at which the board announced the acquisition of the issued share capital of the Scottish Southern Electric Supply Company; the shareholders approved the scheme.

Cables and Wireless.

Revised rates come into force on the Imperial and International Communications system on Wednesday in this week, and these will bring into close correspondence the charges made for cables and for messages sent by the wireless systems. There is still a certain amount of hesitation felt on

the part of stockholders in Cables & Wireless as to whether the reductions will be accompanied by such an expansion of business as will enable the net receipts to be maintained. As the figures are being published monthly, this will enable comparison to be closely watched. In the meantime, the markets for the stocks are a little uncertain. though no further falls have occurred. Globe Telegraph & Trust ordinary shares are, however, 25s. lower at 14½. Many people are still on the lookout for a possible opportunity to buy £100 each of the Cable and Wireless trio for £100, such as occurred last month, just before there was the sharp rise which lifted the trio to the neighbourhood of 130. The subsequent reaction has carried down the prices to 112½, which is ex the recently-paid dividend on the 5½ per cent. preference stock. Speculators regard the "A" ordinary stock as a lively counter in view of the abrupt manner in which the price rises and falls, and for this reason there is more activity in the "A" stock than there is in either the preference or the "B" ordinary. Amongst other cable issues, Anglo-American preferred at 101½ is the fraction higher. There has been a recovery in the price of Automatic Telephones, taking the shares to 32s. 6d. ex dividend. American Telephone & Telegraph stock has, however, fallen to 210 xd, and Internationals to 34½ xd. Marconi Marines eased off to 33s. 9d. Canadian Marconis are 15s.

Home Railway Stocks.

Interest is maintained in the possibilities presented by Metropolitan consolidated stock. The latest rumours hint at a bringing to bear of mild pressure upon the Metropolitan board by interests connected with the company, who, according to this gossip, are a little impatient at the protracted character of the negotiations between the Metropolitan Railway and the Underground Electric Railways of London. Everybody knows, of course, that offers have been made from time to time by one side or the other, with the object of absorption of the Metropolitan into the Underground Electric Railways, and it seems to be fairly common knowledge that such a fusion would have been effected long ago had it not been for the terms that the Metropolitan considered it reasonable to expect. The Underground Electric Railways of London has plenty of work on hand to keep it busy for some years to come in the way of extensions, but no doubt the board will be ready to lend an attentive ear to what the directors regard as businesslike proposals if the Metropolitan Railway should again approach the subject of amalgamation. Meanwhile, Metropolitan ordinary stock has risen to 70. Underground Electric ordinary shares are 6d. better at 24s.

The Manufacturing Companies.

For an unsatisfactory state of affairs in the prices of manufacturing and equipment companies' issues, the only reason is that of general conditions, and the disinclination on the part of the public to embark upon fresh purchases of shares at a time when the industrial outlook remains cloudy. Henley's have gone back to 5 13/16, Siemens to 22s., Callenders to 3 5/16, and Associated Electrical Industries ordinary to 22s. 6d. British Insulated ordinary recovered the dividend deduction made in the last Stock Exchange pay-day. G.E.C. ordinary eased off to 47s. 6d., apparently on a few sales of shares made by people who wished to subscribe to the new issue of debentures. British Aluminium ordinary are a shade better at 40s. xd, and amongst the preference shares, Callenders 6½ per cents. came into demand, rising to 25s middle. Prices of iron, steel, and allied shares lean to the lower side; Vickers, for instance, have shaded off to 7s. 3d. The Armstrong Company has received a substantial order for Diesel-electric power plant from the Buenos Aires Great Southern Railway Company. The price of Armstrong "A" ordinary 1s. shares is about 6d., and the 4 per cent. debenture stock stands at 68½. Brush ordinary stock has fallen 5 to 105.

Latin-Canadians.

Reference has already been made to the weakness which occurs every now and then in the New York Stock Exchanges, and which suggests that the industrial state of affairs in America is not much better than that which prevails in the Old Country. The U.S.A. has an enormous number of unemployed, and the various utility companies obviously feel the pinch of diminished trade. The earnings of some, however, are well maintained, and this applies not only to the American companies, but to those of Canada as well. For instance, the British Columbia Power Corporation in its second annual report announces a steady increase in sales of energy, and in the number of customers served. The prices of the company's shares are, however, dull, the "A" being 37¾ and the "B" 15. The Barcelona Traction, Light & Power Company, which is run from Toronto, continues to achieve good results, though the price of the shares dwindles, and has receded to 28½. The Mexico Tramways had a net deficit for the eight months ended in August of 490,000 pesos, but, on the other hand, the Mexican Light & Power Company increased its takings during the same period to 7½ million pesos, the latter being about 400,000 pesos better than those of the corresponding period of 1929. Brazilian Traction shares, after being 37, have gone back to 34, and of other utility stocks, Shawinigan Water shares at 66½ Power Corporation of Canada at 63 (after being 68) are both easier on the week. City Services 6 per cent. preferred shares are 8 lower at 84½. Hydro-Electrics gave way to 36½ and Americans as a whole have been heavy

Share List of Electrical Companies.

Home Electricity Companies.

	Nom.	Approx. Dividend. 1928.	1929.	Price Sept. 30 1930.	Rise or fall	Yield p.c.
	£					
Bournemouth and Poole	1	15	15	58/9	—	5 2 0
Brompton Ordinary	1	8½	8½	26/6	—	5 5 8
Charing Cross Ordinary	1	8½	8½	28/-	—	5 0 0
do. do. 4½% Pref.	1	4½	4½	18/-	—	5 0 0
Chelsea	1	8⅞	8⅞	27/-	—	5 3 8
City of London	1	10	10	33/9	—	4 8 1
do. do. 6% Pref.	1	6	6	23/6	—	5 2 2
Clyde Valley	1	8	8	37/6	—	4 5 4
County of London	1	7	10	46/9	—	4 5 6
do. do. 6% Pref.	1	6	6	23/6	—	5 2 2
Edmundson's 7% Pref.	1	7	7	24/-	—	5 16 8
Elec. Supply Corporation	1	11	11	47/-xd	+3/32	4 13 7
Kensington Ordinary	1	8	8	27/-	—	5 3 8
Lancs. Light and Power	1	7½	7	24/-	—	5 16 8
London Electric	1	8½	9	30/-	—	4 13 4
Metropolitan	1	9	10	2 7/8	—	4 17 1
do. 4½% Pref.	1	4½	4½	17/-	—	5 6 0
Midland Counties	1	6½	7	28/-	—6d.	5 0 0
Mid. Elec. Power	1	15	8	30/9	+9d.	5 4 1
Newcastle-on-Tyne Ordinary	1	6	6	29/9xd	+6d.	5 1 1
do. 7% Pref.	1	7	7	26/-xd	—	5 7 8
Notting Hill 6% Pref.	10	6	6	10½	—	5 11 4
North Met. Elec. 6% Pref.	1	6	6	23/6	—	5 2 2
St. James' and Pall Mall	1	8	8	27/6	—	5 1 10
Scottish Power	1	8	8	28/6	—	5 12 4
South London	1	8½	8½	27/-	—	5 8 8
Urban Ordinary	1	7	7	28/9	—	4 17 5
Westminster Ordinary	1	8½	8½	27/6	—	5 1 10
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	24/6xd	+3/32	6 2 5
Yorkshire Elec.	1	8	8	31/3	—	5 2 5

Home Rails.

Central London Ord. Assented	Stock	4	4	78	—	5 2 7
Metropolitan	"	3½	4	70	+1½	5 14 4
do. District	"	4	5	75	—	6 12 5
Underground Electric	£1	7	8	24/-	+6d.	6 13 4
do. do. Income	Bonds	6	6	104	—	5 15 5

Telegraphs and Telephones.

Anglo-Am. Tel. Pref.	Stock	6	6	101½	+¼	5 17 1
do. Def.	"	1½	1½	25	—	6 0 0
Automatic Telephone	1	10	12½	32/6	+1/16	7 13 10
Cables & Wireless 5½ Pref.	Stock	—	5½	74½	—	7 7 8
do. A 7½ Ord.	"	—	23½	25½	—	... ...
do. B Ord.	"	—	—	12½	—	... ...
Globe Tel. and T. Ord.	10	10	10	14½	−1¼	*6 18 0
do. do. Pref.	10	6	6	10¾	—	5 11 7
Great Northern Tel.	10	20	20	30	—	6 13 4
Marconi-Marine	1	12½	15	35/9	—	8 8 6
Oriental Telephone Ord.	1	12	12	2 7/8	—	*4 18 4

Home and Foreign Trams, &c.

Anglo-Arg. Trams First Pref.	5	5½	5½	2½	—	11 0 0
do. do. 2nd Pref.	5	6	6	2¼	+⅛	14 2 4
do. do. 5% Deb.	Stock	5	5	61	—	8 4 0
British Electric Traction Def. Ord.	"	5	5	1425	—50	... ...
do. do. Pref. Ord.	"	8	8	123½	—	6 6 6
Brazil Traction	100	7	8	34	−1½	5 17 8
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	91½	—	5 9 8
London & Sub. Trac. 5% Pref.	1	Nil	Nil	10/6	+6d.	... ...
London United Tram Deb.	Stock	4	4	52½	—	7 12 4
Mexico Trams, 5% Bonds	—	5	5	57	—	8 15 6
Mexican Light Common	100	Nil	Nil	69½	—	... ...
do. 7% Pref.	100	7	7	76½	—	9 8 0
do. 1st Bonds	—	5	5	80	—	6 5 0
Victoria Falls Ord.	1	15	15	3	—1/32	5 0 0
Yorkshire (West Riding)		Nil	Nil	5/-	—	... ...

Manufacturing Companies.

Assoc. Elec. Ord.	1	6	6	22/6	—2/-	5 6 8
Babcock & Wilcox	1	12	15	53/3	- 6d.	*6 12 9
British Aluminium Ord.	1	10	10	2xd	+6d.	5 0 0
British Elec. Transformer Pref.	1	7	7	8/9	—	... ...
British Insulated Ord.	1	15	15	3½	—¼	4 5 9
Brush Ord.	Stock	10	10	105	−5	9 10 6
Callenders	1	15	15	3 5/16	—1/16	4 10 8
do. 6½% Pref.	1	6½	6½	25/-	+1/4	5 4 0
Crompton Parkinson Ord.	5/-	—	90	20/-xd	—	7 10 0
do. 8% Pref.	1	8	8	25/9xd	+3/32	6 4 3
Edison-Swan 1st. Pref.	1	7½	7½	26/3	—	5 14 3
do. 5% Deb.	Stock	5	5	84½	—	5 18 4
Electric Construction	1	5½	5	12/-	—	8 6 8
Enfield Cable Ord.	1	20	25	4½	—	5 17 8
English Electric	1	Nil	Nil	12/6	—	... ...
do. do. Pref.	1	3	Nil	8/9	—	... ...
Gen. Elec. Pref.	1	6½	6½	23/9	—	5 9 5
do. Ord.	1	10	14	47/6	—9d.	5 16 0
Henley	1	25	30	5 13/16	—1/16	5 5 1
do. 4½% Pref.	5	4½	4½	4½	—	5 6
India-Rubber	1	Nil	Nil	7/6	—	... ...
Johnson & Phillips	1	10	10	15	—	5 6 8
Siemens Ord.	1	7½	7½	22/-	—1/9	6 16 4
Telegraph Construction	12	10	10	19	—	*6 6 7

* Dividends paid free of Income Tax.

The Industrial and Commercial Position.

A series of pronouncements on matters of vital importance.

DURING the past week or two a number of leaders of industry, commerce and finance have expressed their views on the existing state of affairs and have suggested means by which the long-sustained depression from which the country is suffering might be relieved. Brief summaries of a few of these pronouncements are given below:—

The Council of Industry.

The meeting held in London last week to form a National Council of Industry, referred to in our last issue, passed the following resolutions:—

"That the time has now arrived when it is essential that Great Britain should adopt a fiscal policy capable of meeting the crying needs of the times, and especially of opening and preserving Empire markets for Empire products. That immediate steps should be taken to protect home industries by the imposition of appropriate tariffs against imports from foreign nations which injuriously affect our trade and employment or limit the development of our Imperial resources or hinder the co-operation of the component parts of the Empire. That the earliest possible action should be taken in consultation with our Dominions to design a fiscal system for the mutual advantage of the nations of the British Commonwealth. And that a National Council of Industry and Commerce be, and hereby is, formed to promote in every way the aforesaid objects irrespective of party politics."

And "That whatever party may be in office for the time, our Government must keep its expenditure within the capacity of the country to pay and that a drastic reduction of taxation is urgently necessary if prosperity is to be restored to agriculture and industry."

Trade Problems.

Addressing the autumnal meeting of the Association of British Chambers of Commerce, Sir Walter Raine said that we should have to do something drastic in order to show the foreigner that he was not going to have the free run of our markets indefinitely. The whole world was suffering more or less from a severe "slump" but this country was feeling it most and was carrying a burden that was literally intolerable. It might be that the cheapness of money would cause the wheels of industry to move again. Notwithstanding all the factors militating against our trade there were people who were seriously advocating a reduction of hours, more holidays and more pay. What we needed, said Sir Walter, was more work and less disposition to put obstacles in the way of efficient execution of the orders that we did obtain. He went on to urge employers not to be so ready to cut down expenses in every direction in these bad times but to increase their account for advertising and thus increase their business.

Finance and Taxation.

If the Companies Committee of 1926 had had before them the experience of the short-lived flotations of 1928 and 1929, said Mr. Henry Morgan, President of the Society of Incorporated Accountants and Auditors, at Sheffield last week, their recommendations would have been more drastic and a more stringent Companies Bill would have resulted. Mr. Morgan delivered a valuable address on many points affecting investment, procedure at company meetings, the necessity for informing shareholders of the nature of proposals to come before meetings which they could not attend and so forth. In referring to public finance and the restoration of confidence he said that no further commitments should be made for social services and public assistance. Taxation was far heavier in the United Kingdom than in any of the countries with which we were in industrial competition.

A Joint Industrial Memorandum.

A memorandum prepared jointly by the General Council of the Trades Union Congress and the Federation of British Industries was addressed to the Prime Minister last week. This deals with matters with which the Imperial Economic Conference will be concerned and suggests means by which inter-Imperial trade could be stimulated and expanded and the Empire's resources co-ordinated and developed. The memorandum urges that at as early a date as possible a Commonwealth Trade Conference should be held of an investigatory, advisory and no-party nature consisting of persons nominated by each Government of the Empire, but acting in their personal capacity, composed of high Government officials concerned with economic and trade questions, representatives of industry and agriculture (both employers and employed), and representatives of commerce, finance, and shipping. The objects of this Conference would be to examine the problem of inter-Commonwealth trade with a view to laying down a sound basis for Commonwealth economic policy, to draw up an agenda for the next Imperial Conference, and act as an investigating body and form constructive proposals for the Governments' consideration. It is also proposed that a Commonwealth Economic Secretariat should be established formed of persons with economic and administrative experience, drawn from all parts of the Commonwealth, to act as a permanent secretariat for all Imperial Conferences on economic questions. If such a system were established, it is stated, it would give the Commonwealth an adequate machinery, which to-day it does not possess, for dealing with problems of vital importance.

Brazil's Vast Water-powers.

A Promising Market.

ALTHOUGH, up to the present, Brazil has not offered such an extensive market to the British electrical manufacturer as have many other countries with a much smaller potential development, the progress being made in the harnessing of water power should not go altogether unnoticed by firms manufacturing equipment suitable to the needs of the Brazilian people who are being accustomed to the utilisation of electricity. The present revulsion in the Latin-American world against the economic penetration of the United States, particularly since the recent raising of the American tariff, is another factor which should lead business men to study whether British electrical machinery and equipment could find a better market in the largest of the countries in the vast continent of South America.

Electrical development in Brazil owes much of its present importance to the enterprise of a number of Canadian financiers and engineers, notably Sir William Mackenzie, one of the builders of the Canadian Northern Railway system now merged with the Grand Trunk in the Canadian National Railways. The Brazilian Traction, Light and Power Co., Ltd., founded under Canadian auspices over thirty years ago, is now one of the largest public utility services outside North America, but during the past three or four years United States capital has also come into the field. By the purchase of local distribution systems outside the sphere of influence of the Canadian concern, an American company now owns and operates a chain of generating and distributing plants accounting for about a sixth of the developed water power of the country. A great deal of interesting information relative to the available water power in Brazil, and to the steps taken to develop hydro-electric energy for distribution in Rio de Janeiro, Sao Paulo, Santos and the neighbourhood, was given in a paper recently prepared by Mr. A. W. K. Billings, M.E.I.C., vice-president in charge of construction and hydraulic developments, Brazilian Traction, Light & Power Co., Ltd., for the Montreal branch of the Engineering Institute of Canada, and published in a recent issue of the Institute's journal.

Brazil, with a population little short of that of Great Britain or France, has an enormous area, and is endowed with immense potential water power, calculations of which (mostly extremely unreliable) reach a total between 20,000,000 and 60,000,000 h.p. Some of the rivers have a potential power development of as much as twelve to twenty million h.p., with a minimum flow at the Guayra Fall on the Parana reckoned to be double the average measured at Niagara, and a maximum flow in flood time of nearly 3,000,000 second-feet. Such a stream, of course, is unfitted for power development, and many other mammoth "water powers" are of little or no economic importance owing to their distance from the southern plateau on which most of the industrial development of Brazil has up to the present taken place. Most of the successful power development in the Republic up to the present has been in the direction of harnessing comparatively small sources of about 70,000 h.p., of which there are very many quite close to centres of population, and in diverting in a direction leading steeply to the sea-coast volumes of rainfall which would naturally take a leisurely course to the vast inland rivers.

Three principal power zones exist in the Republic, the central one embracing the States of Sao Paulo, Rio de Janeiro, parts of Minas Geraes, Parana and Santa Catherina. Although only about 600,000 h.p. has as yet been utilised, a large number of useful power sites ranging from 6,000 h.p. to 50,000 h.p. or more remain undeveloped in one or other of the economic power zones. In Sao Paulo, for instance, the total potential resources are believed to exceed 2,000,000 h.p.

As already indicated, two large groups at present control most of the developed water power in the Republic. The Brazilian Traction, Light and Power Co., Ltd., together with its allied concern, the Sao Paulo Tramway, Light and Power Co., Ltd., has installed upwards of 500,000 h.p. of plant. One of the plants of the subsidiary Rio de Janeiro Tramway, Light and Power Co., Ltd., has an installed capacity of 112,000 h.p., and the other 90,000 h.p. The Sao Paulo Company has four plants under its direct control, the largest of which, the Serra development, is reckoned at about 148,000 h.p., the others being, respectively, 25,500 h.p., 77,500 h.p., and 32,000 h.p. There are a number of subsidiary plants ranging from 65 h.p. to 15,000 h.p. The vast Serra development is an example of the practice likely to be widely followed in Brazil. The flow of a number of streams draining into the interior was reversed by the construction of dams diverting their waters into a series of

reservoirs from which water is piped down a precipitous fall of about 2,400 ft. over the Serra da Mar. The power plant of 88,000-h.p. capacity is now being enlarged by the addition of a third turbine unit of 60,000 h.p. A super-power system is a possibility of the future with the projected linking-up of the separate plants of the Sao Paulo and Rio de Janeiro stations, and this would be hastened should the electrification of the railways be decided upon owing to the high cost of imported coal and petroleum.

The American group of plants, known as the Empresas Electricas Bresileiras, serves a number of small municipalities with a population of about 1,200,000 in the northern zone of Brazil, and important development work is in progress in Parana and Bahia. Here, about 50 miles from Curitiba, the capital of Parana, the Chaminé Falls are to be harnessed by a 10,000-h.p. (later 20,000-h.p.) power plant, from which electricity will be distributed throughout the surrounding district. In Bahia the Empresas Electricas is also constructing the new Bananeiras dam on the Paraguassu River, which will enable it to arrange for a great expansion in the installation for the supply of Bahia. The total capacity of the existing plants in the company's widespread system is about 90,500 h.p., some of the units being quite small ones of about 134 kVA and others ranging up to 9,000 kVA. The American interests, in the construction of the new Bananeiras dam, are engaged in building the largest reinforced-concrete multiple arch structure of the kind in South America, which will increase the available storage by 74,000,000 tons.

Much might be added regarding some of the smaller enterprises of one or other of these concerns, in particular that of the Brazilian Traction concern at Ilha dos Pombos, which, utilising a flow one-third more than the flow of the Niagara River, or 283,000 second-feet, diminishing to 7,000 second-feet at its minimum, has a total designed capacity of 204,000 h.p., with three units already installed generating 116,000 h.p. Water for the operation of this plant passes through eight Stoney gates and three large automatic sector gates of reinforced concrete forming a diversion dam, these being the largest ever built. Each gate is 148 ft. long, 35 ft. in radius, 24 ft. in clear depth of water over the sill, and weighs over 2,100 tons. At normal water level 1,800 tons of water can be passed per second.

And what of the market for this vast potential and developed water power? The portion of Brazil most amply supplied with electricity at the present time is largely dependent upon the fortunes of the coffee plantations and the textile industry. Mineral development and metallurgical industry are possibilities, but only after years of expensive investigation and research. Bauxite is known to exist in wide areas of practically unprospected country, and might form the basis of an immense aluminium industry rivalling that at Arvida, in Quebec, where the industry depends upon importation from British Guiana. Manganese, lead and silver, some gold, diamonds in quantity, phosphate rock, nickel, and other economic minerals are known to exist comparatively accessible to thickly-settled districts, but little attention has yet been devoted to the deposits. The power companies' load is, therefore, one with a growing tendency, and the market for electrical equipment, large and small, should be one which British, Canadian, and United States manufacturers would find it well worth their while to study with the future demand predominant in their calculations.

High-frequency Steel Furnaces.

A review of present-day practice in their application to steel production, indicating the trend of progress.

By D. F. CAMPBELL.

(Abstract of paper read at the Autumn Meeting of the IRON AND STEEL INSTITUTE *at Prague, Czecho-Slovakia.)*

IRONLESS induction furnaces of the Ajax-Northrup type, having an hourly output of 20 to 25 cwt., have been operated since July, 1929, and smaller units of 5 cwt. capacity have been producing steel regularly since October, 1927.

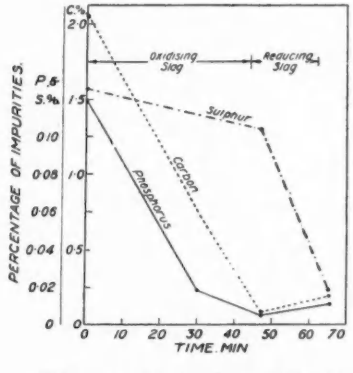
At present the largest units are furnaces of 20 to 25 cwt. capacity per heat, giving an output of 20 tons per day, but the design of furnaces of 3 to 5 tons presents no technical difficulties. Economic considerations indicate the probability that units of less than 15 to 25 tons will be adopted, as in the case of steel-making by the Bessemer or Thomas processes.

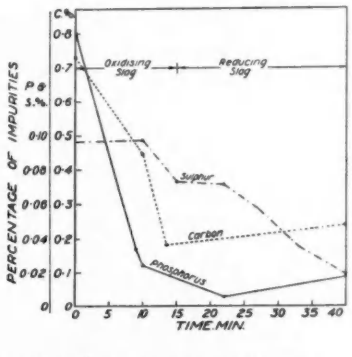
The half-a-dozen steel-making operations to which these furnaces have been commercially applied are given below:—

(*a*) By the melting of high-class tool steels in acid-lined furnaces, to replace the crucible process, a marked reduction in cost and a definite improvement in quality of many steels, especially those containing complex alloys, have been established.

For making tool-steel, 5-cwt. furnaces melting one charge per hour are commonly used. These are considerably cheaper to operate than gas- or coal-fired crucible furnaces, and the labour is less costly and less difficult to obtain. In addition, certain qualities of steel containing complex mixtures of alloys can be made of a homogeneity unobtainable with the ordinary crucible furnace.

A 5-cwt. furnace equipped with a high-frequency generator of 150 kW, operating day and night six days a week, has averaged 108 tons of ingots per month during a period of six months, at a consumption of just over 700 kWh per ton, measured on the incoming cable of the motor driving the generator.





Figs. 1 and 2.—Impurities-Removal (Time) Characteristics of H.F. Furnace.

The most convenient time for making a heat of high-class steel is 1 hour for 5-cwt. furnaces, and about 1 to 1½ hours in the case of 20- to 25-cwt. units.

(*b*) The electric furnace is used for melting steel and alloys requiring lower percentages of carbon than those obtainable by the crucible or arc-furnace processes. In the manufacture of magnetic alloys, a carbon content of less than 0.04 per cent. is necessary, and this composition is readily obtained by melting the highest grade of Swedish wrought-iron with the necessary nickel and other alloys in high-frequency furnaces.

The remelting of low-carbon stainless alloys of the chromium and chromium-nickel series, without any pick-up of carbon, is a valuable use of the high-frequency furnace.

(*c*) The melting in an acid lining of rolling-mill scrap produced from steel made in basic-lined arc furnaces yields a steel with all the qualities of acid steel which are so valuable for gun-, aeroplane- and other steels requiring good transverse tests.

An important steelworks recently designed exclusively for the manufacture of alloy steels for automobiles and similar purposes will use large Héroult furnaces for the defining of basic steel; the rolling-mill scrap of known composition will be remelted in high-frequency furnaces without substantial alteration of composition, and will have all the advantages of a pure steel finished in an acid lining.

(*d*) Heat-resisting steel, die steel, and other complex and refractory chromium alloys can be melted in acid or basic linings without substantial alteration of composition.

(*e*) The melting of nickel-chromium alloys for resistance wires, &c., in furnaces with basic linings permits the use

of lime-fluorspar slags. The use of basic linings, made by the Rohn process, in the furnace is proving very satisfactory when melting hig-nickel alloys which should be covered with a lime-fluorspar slag.

(*f*) Manganese scrap, especially for small castings, can be remelted without substantial loss of manganese, with magnesia or alumina linings.

(*g*) In small furnaces of extra-high frequency (about 20,000 cycles) the melting of hard materials of the tungsten-chromium-cobalt-carbide group, which are being cast in form moulds at a temperature of from 2,000 to 2,300 deg. C., can be carried out.

In addition to the above established industrial uses, rapid progress is being made in determining the commercial value of the following metallurgical operations.

(1) The refining of steel is performed in basic-lined furnaces by slag reactions similar to those used in arc-furnaces

The refining operation is extremely rapid, owing to the circulation of the metal due to electrical forces. Furthermore, this movement constantly brings hot metal in contact with the underside of the slag layer, thus keeping it hot and maintaining ideal refining conditions at the slag-metal contact surface.

Figs. 1 and 2 show the extraordinary rapidity with which carbon and phosphorus are removed under oxidising conditions. These may be obtained either by the use of iron oxide in the form of ore or mill-scale, or, alternatively, by an air blast. Sulphur may also be removed more slowly, and the usual slag reactions may be worked with great rapidity, owing to the speed with which fresh metal is constantly brought into contact with the refining slag.

(2) Duplex processes—either with the open-hearth or with electric arc-furnaces in countries where the latter is the cheaper melting unit, where steel must be finished in an acid lining and only basic steel is available—show considerable promise. For example, in certain Swedish works the following problem presents itself: it is proposed that a 1-ton high-frequency furnace should be installed. This furnace would be capable of making ingots large enough for 90 per cent. of the requirements of the shop. Occasionally, however, ingots up to 10 tons would be wanted, and these would be of a specification requiring acid steel. It is accordingly suggested that a 1,000-kW high-frequency equipment should be installed which would supply alternatively a 1-ton or a 10-ton furnace. The 1-ton furnace would be used for melting, and the 10-ton furnace for finishing steel previously melted in a basic open-hearth or basic electric arc-furnace.

(3) The conversion of molten pig-iron into steel, with the elimination of carbon, silicon, manganese, phosphorus, and sulphur, is carried in basic-lined furnaces. The possibilities of converting liquid pig-iron into steel are extremely interesting on account of the great rapidity with which the reactions occur, owing to the intense circulation. The excessive over-oxidation of the basic Bessemer (Thomas) process is avoided, and by control of the circulation the conditions may be varied from those of a violently oxidising furnace to the comparative tranquility of an open-hearth or crucible furnace, which is desirable for finishing processes.

If a comparison be made between a steelworks equipped with six 75-ton open-hearth furnaces producing 6,000 tons a week, and ten 6-ton high-frequency units giving the same output and casting direct into ingot moulds, it will be found that the capital cost of the latter equipment will be considerably less, and the operating advantages would be numerous. Instead of 100-ton cranes and buildings of corresponding strength, the maximum lift in the melting shop would be limited to 10 tons, while a regular supply of ingots would be available at regular intervals, which would avoid the necessity of large and expensive soaking pits and ladles. The fact that steel may be charged within a few minutes of starting work on Monday morning, and the possibility of completely shutting down furnaces during week-ends, are important features which are also attractive in the case of the Bessemer process.

The space occupied by six 75-ton open-hearth furnaces, and ten 6-ton high-frequency furnaces, with two metal mixers in each case, would be about 70,000 and 32,000 sq. ft., respectively. The improvement in the efficiency of motor-generator sets is remarkable. For 150-kW generator sets efficiencies of 73 to 75 per cent. were acceptable two years ago, but now 83 to 85 per cent. is obtainable for this size of machine. This improvement represents a saving of about 70 kWh per ton in normal practice, or about £200 per annum when using electricity at 0.6d. per kWh and melting 100 tons per month.

British motor-generator sets of 400 kW output are now giving 84 to 85 per cent. efficiency, and 650-kW sets an overall efficiency of 88 to 89 per cent., thus reducing the conversion losses to comparatively low figures.

It is true that in the arc-furnace the transformation losses are less, as static transformers are used, but the arc-furnace efficiency is very low as compared with that of the induction furnace.

Improvements in condensers have been rapid, aluminium sheet having generally replaced tin-foil, while water-cooling by internal coils or by external cooling tanks has been generally adopted.

The bodies of the smaller furnaces are built of asbestos cement boards, with non-magnetic metal skeletons, and the larger ones may be built either in the same way or of steel plate with suitable magnetic shields.

If any magnetic structure is near the inductor coil, a shield must be provided between the latter and the steel casing. This consists of a number of silicon-steel laminated "legs," similar to those used in the construction of a transformer, so disposed as to make an easy path for the magnetic flux and shield the outer steel plate from the lines of force which produce eddy currents.

The alternative method of building with larger air spaces round the inductor coil, on a frame of non-magnetic metal with asbestos cement composition boards, is quite serviceable and less costly.

The charging door consists of a hole in the working platform, and a 1-ton furnace can be charged in 1 to 2 min., if a reasonable quality of scrap is available. One man is sufficient to charge and cast 1 ton of metal every 60 to 75 min., provided the raw material is delivered on to the platform and the ingot moulds are prepared and stripped by pit men.

The repairs to refractories of the induction furnace between heats are almost negligible, and there is no excessive wear at the slag line or bottom.

The following figures indicate the relative weights of the refractories in furnaces of a daily output of 20 tons:—(1) High-frequency (20 cwt.), 4 cwt. of refractory; (2) arc-furnace (4 ton), 260 cwt. of refractory; (3) open-hearth (8 ton), 2,000 cwt. of refractory.

The small weight of brickwork to be heated in high-frequency furnaces, as compared with other furnaces, results in low power consumption for intermittent work, and the possibility of pouring a heat of steel within 80 min. of starting with a cold furnace.

The following figures show results obtained when melting alloy steels of the composition indicated in 10-cwt. and 20-25-cwt. furnaces, respectively. The higher power consumption of the larger furnaces is not always due to a difference of efficiency in the melting equipment, as steel-making practice varies very much in different works:—

10-CWT. HIGH-FREQUENCY FURNACE.

Heat No.	Type of Steel.	Time, Min.	kWh per ton.
4	18% tungsten	63	640
5	,, ,, ...	65	650
6	Carbon	64	640
7	,, ...	66	700
8	20% tungsten	54	576
9	,, ,, ...	54	588
10	,, ,, ...	53	553
11	Carbon	62	652
12	,, ...	66	658
13	,, ...	60	635
14	18% tungsten	59	610
15	20% ,, ...	65	600
16	,, ,, ...	60	634
17	Stainless	69	686
18	18% tungsten	57	608
19	18% Cr., 8% Ni.	59	626
20	20% tungsten	85	670
21	,, ,, ...	54	572
22	,, ,, ...	61	590
23	,, ,, ...	57	582
24	,, ,, ...	53	578
25	,, ,, ...	50	556
26	,, ,, ...	54	572
27	,, ,, ...	55	556
28	,, ,, ...	54	548
29	,, ,, ...	55	554
30	,, ,, ...	53	579
31	,, ,, ...	56	579

Average per charge: 60 min.; 605 kWh per ton.

20 TO 25-CWT. AJAX-NORTHRUP FURNACE.

Type of Steel.	Time, Min.	Weight of Charge, Kg.	kWh per ton.
2% nickel	82	1,250	670
Carbon-chromium ...	87	1,050	710*
Manganese	75	1,050	590
Manganese ...* ...	65	1,050	590
Nickel-chromium ...	87	1,250	525

* First heat of day; cold furnace.

With the above furnace 30 consecutive heats produced 34,300 kg. of ingots for a power consumption of 690 kWh per 1,000 kg., including all delays, stoppages, and time occupied in casting.

Diesel-electric Traction.

The preliminary trials of two locomotives for service on the Indian State Railways have recently been completed.

THE improvement effected in the design of Diesel engines during recent years, and their reliability as demonstrated under conditions of heavy duty, have turned the minds of locomotive engineers to the possibilities of the employment of such units as sources of power in substitution for steam on locomotives. The problem of transmitting the drive from the engine crankshaft to the driving wheels is of major importance in Diesel-locomotive design, the torque-speed characteristics of the engine being fundamentally dissimilar from those of the steam engine. It appears to be now accepted that, above small powers, the mechanical drive is unsuitable; hydraulic transmission is heavy and cumbrous, while transmission by compressed air seems unlikely by reason of its inefficiency. There remains the electric drive, and it is this method of transmission which has been adopted in the majority of modern installations.

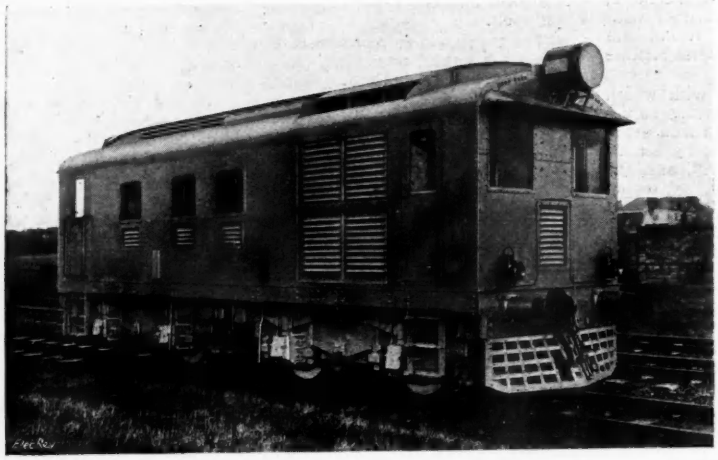


Fig. 1.—A 350-h.p. Diesel-electric Locomotive.

The General Electric Co., Ltd., has recently completed preliminary trials of two Diesel-electric locomotives on a branch line of the L.M.S. Railway in Scotland. These locomotives, fig. 1, the electrical equipments of which are constructed in accordance with the Oerlikon system, are required for duty on short runs on both main and branch lines of the North-Western Railway of India, and are intended to meet the steadily increasing competition from road transport experienced during the last two or three years. It was specified that with a light load on a level track a speed of 50 to 55 miles per hour should be possible, while with a train consisting of three bogie vehicles having a gross weight of 100 tons, the normal running speed should be 47 m.p.h.

The locomotives are of the double-bogie type, without articulation. The superstructure follows the recognised design for electric locomotives, and consists of a long cab divided into three compartments. A driving compartment is arranged at each end, containing a master controller and other equipment for the driver's convenience, while the central compartment houses the Diesel engine, generator, oil- and water-cooling radiators, and other equipment. One of the driving positions is illustrated in fig. 4, from which it will be seen that control of the locomotive has been reduced to its simplest form. The length of each locomotive over the buffers is 35 ft. 10 in., and the overall width is 9 ft. The track gauge is 5 ft. 6 in., the maximum tractive effort is 10,000 lb., and the continuous output of the Diesel engine is 350 h.p. at 900 r.p.m. There are four driving motors employed for each locomotive. The engine is of the high-speed type built by Messrs. William Beardmore & Co., Ltd., and it functions on the four-cycle fluid-pressure injection system. The six cylinders of the engine are arranged in line, and the engine forms a self-contained unit complete with its own water and lubricating oil pumps, both of which are automatically controlled. Fig. 2 shows the engine and generator erected on the test bed. Control of the speed of the engine is effected primarily by variation of the speed of the governor, the latter being arranged with four definite settings giving speeds of 400, 600, 750 and 900 r.p.m., while an automatic overspeed device is fitted which prevents the engine exceeding a speed of 1,050 r.p.m. by venting the fuel pump. The governor setting for these four speeds is controlled by a series of valves electrically operated from the master controller. Two radiators of the spiral gilled-tube type are mounted one on each side of the locomotive for cooling the lubricating oil and the cooling-water, respectively. Large fans, driven from the engine, draw air through each of the radiators, discharging it *via* ducts leading to the roof of the locomotive. A thermostat-controlled by-pass ensures that the cooling water reaches the correct temperature as quickly as possible after starting by allowing the water to short-circuit the radiator. Temperature indicators for both lubricating oil and cooling water are mounted on the instrument panels in the driving compartments. Sufficient fuel oil is carried in a 150-gal. tank for the locomotive to run for seven hours on full load. The oil is delivered to the main fuel pump at a pressure of 40 lb. per sq. in. by a booster pump mounted on the engine.

The engine is started by supplying current from a storage battery to motor the generator. The control is so arranged that it is impossible for the driver to start the engine on full compression. Furthermore, a safety device is introduced in the form of a special relay which prevents the generator passing a heavy charging current to the battery should the driver keep the starting connections in operation after the engine has started. The control consists of a push button suitably interlocked with the de-compression lever, both of which are mounted on the engine. Three push buttons for stopping the engine are also provided, and these are situated one in each driving position and one in the engine compartment.

The main generator is nominally rated at 250 kW and supplies current at pressures varying between 100 and 800 volts, depending on the speed and load. Only one bearing, of the "Hoffman" roller type, is included in the construction of the machine, this being situated at the exciter end of the armature shaft, the other end of which is coupled to the engine flywheel by means of a solid spigot and bolt coupling. In order to obtain a heavy drooping characteristic the generator is provided with an inverse compound winding which has the effect of limiting the output of the machine, the windings being so proportioned that the engine can never be

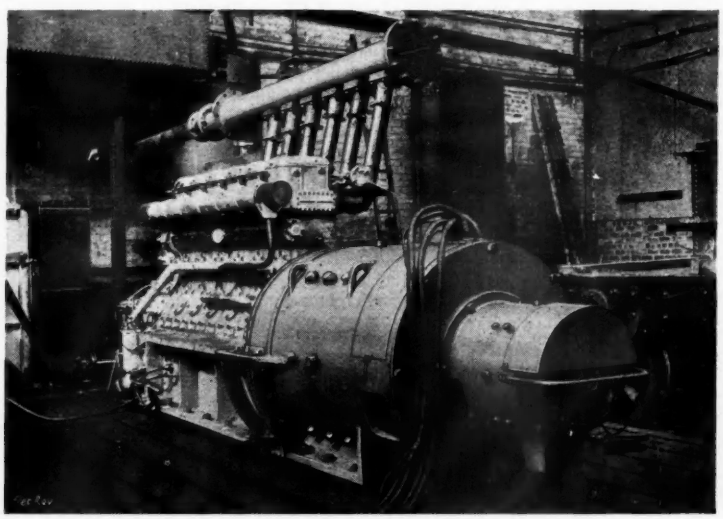


Fig. 2.—Power Unit Erected on Test Bed.

seriously overloaded. A simple means of adjustment is provided in the form of resistances which will allow any subsequent alteration to be made to suit any special service conditions.

The overhung exciter follows normal practice and is rated at 10 kW, with a normal voltage of 120. Actually the exciter would be more correctly termed an auxiliary low-pressure generator, as it supplies current when running at speeds of 750 and 900 r.p.m., not only to the main generator field, but also to the vacuum-brake exhauster motor, while it also assists in maintaining the battery in a charged condition. An automatically operated series resistance inserted in the shunt field enables the exciter to maintain the same voltage at both the speeds indicated. Below these speeds, that is at 400 and 600 r.p.m., the battery supplies the total low-pressure current required by the generator field, exhauster motor, lighting, and the control system. The exciter is also designed with a slightly drooping characteristic.

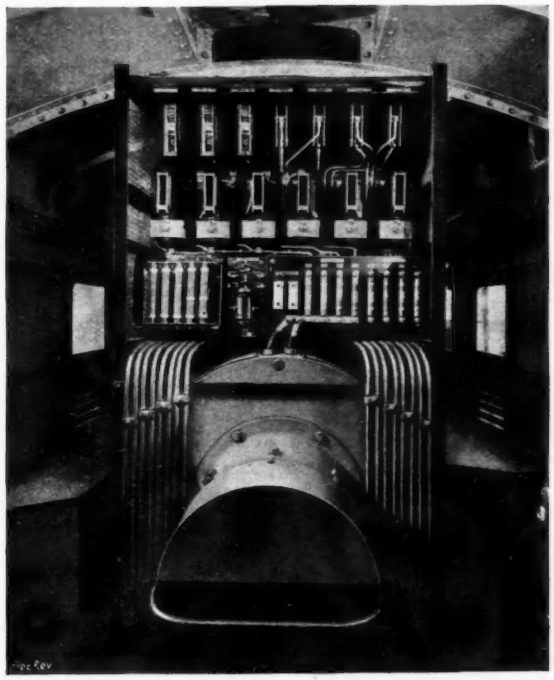


Fig. 3.—Inside Centre Compartment; Main Control Panel over Generator.

The traction motors follow standard practice; their normal one-hour rating is 120 amperes at 600 volts, and they are arranged for field shunting, approximately 35 per cent. field shunt being provided. The motors are axle hung, their drive being transmitted to the axles by single-reduction spur gearing enclosed in oil-tight gear cases.

A small petrol-engine-driven generator, fig. 5, which serves for maintaining the battery in a properly charged condition, is rated at 5 kW and supplies direct current at 110/135 volts, 1,200 r.p.m. The battery obtains sufficient charging current from the exciter during the normal running of the locomotive, but as the latter may, on occasions, be used in abnormal circumstances in out of the way localities, it is considered necessary to have an auxiliary for giving the battery periodical gassing charges and thus keep it in good condition. The battery consists of 50 cells, supplied by the D.P. Battery Co., Ltd., having a total capacity of 224 Ah at the 5-hour rate of discharge.

Each locomotive is equipped with separate vacuum and hand-operated braking systems, the controls of which may be seen on the left and right, respectively, of the master controller in the driving compartment, fig. 4. For the vacuum brake a small d.c. motor drives a "Reavell" exhauster, which requires approximately 3½ h.p. at normal speed and about 6 h.p. at high speed. Normally the motor is supplied with current from the exciter when the latter is running at 750 or 900 r.p.m., but at the two lower speed settings it is fed from the battery. Although this necessitates a rather more expensive arrangement than that of driving the exhauster directly off the main engine, the advantages gained by the system adopted are such as to give improved working and reliability. Moreover, the speed of the exhauster can be arranged to suit the brake conditions, entirely independently of the speed of the engine. A driver's valve is provided which, when in the fully released position, automatically accelerates the exhauster for the release of the brakes.

Reversing is accomplished by means of the usual type of solenoid-operated railway reverser, while other functions are carried out by means of contactors, the whole of which are operated from the master controller and are mounted on the various panels in the engine compartment. The main panel situated above the generator is illustrated in fig. 3, and the auxiliary panel in fig. 5. Interlocks are introduced in certain cases for the safety of the equipment, so that faulty connections cannot be made in the event of any contactor failing or remaining closed. In the "off" position, the motor circuits are entirely broken by the appropriate contactors. For the control of field of the main generator, two sections of resistance are employed, one section being used only for the first step, thus facilitating suitable control of the locomotive when running light.

The consulting engineers for the work were Messrs. Rendel, Palmer & Tritton. The electrical equipment was manufactured throughout by the main contractors, the General Electric Co., Ltd., while the engines and mechanical portions were constructed by their sub-contractors, Messrs. William Beardmore and Co., Ltd.

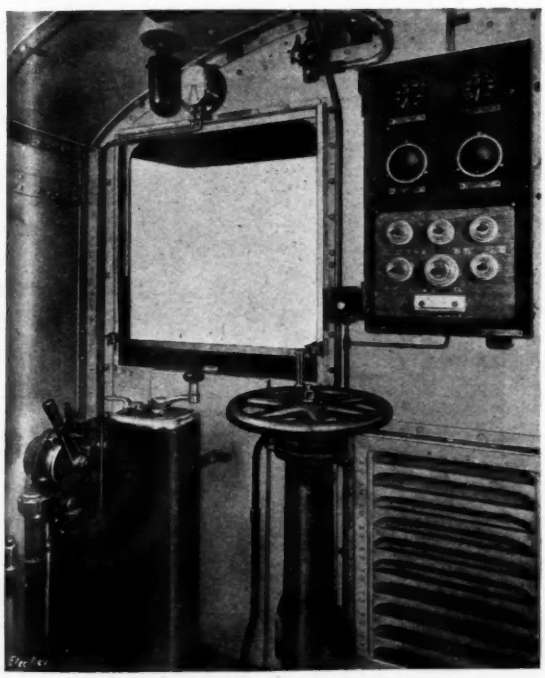


Fig. 4.—Controls and Instruments in Driving Compartment.

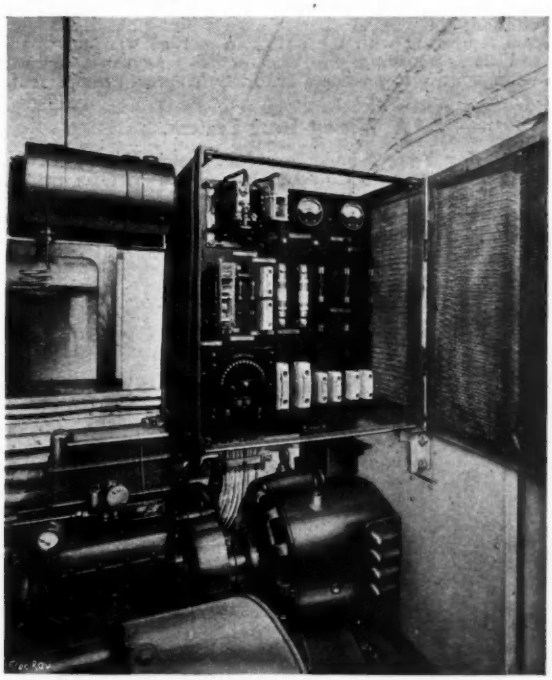


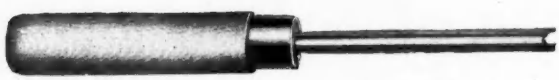
Fig. 5.—Auxiliary Generator Set and Control Panel.

New Electrical Devices, Fittings, and Plant.

Readers are invited to submit particulars of new or improved devices and apparatus for publication in this section.

A Locked-cover Tumbler-switch.

Following on the details of a shielded shockproof tumbler switch which appeared in our last issue, we have now received from Messrs. J. A. Crabtree & Co., Ltd., Lincoln Works, Walsall, a sample of their standard "Lincoln" shockproof locked-cover switch, List No. 3005 range. This switch is of the all-



Figs. 1 and 2.—"Crabtree Lincoln" Locked-cover Switch and Special Unlocking Tool.

bakelite type, and the cover is fixed by two recessed screws as shown in fig. 1. Due to the peculiar shape of the screw-heads, it is quite impossible, it is claimed, to remove the cover without the assistance of the special tool provided, fig. 2. Messrs. Crabtree point out that tumbler switches of the "safety" type have the greatest vogue in schools and asylums. In such institutions there is, of course, always a risk that, to the person tampering with the switch, a worded warning would have little or no significance, and for this reason it is claimed to be imperative to provide a definitely foolproof arrangement.

A Wiring Duct System.

The "Key Fibre" underfloor duct system introduced by the Key Engineering Co., Ltd., 4, Queen Victoria Street,

Fig. 3.—"Key Fibre" System before Floor Construction.

E.C.4, provides, it is claimed, not only for the initial demand for electric points in large office buildings, but also for future increases and changes. The system employs a grid of "Key Fibre" conduits, which is laid down during the construction of the building, fig. 3, having parallels about 4 ft. 6 in. apart, so that every desk has under it a duct which can be easily tapped for lighting, power, or telephone service. During floor construction no outlets are fixed, as it is a very simple business to chisel through the floor, cut out a disk of fibre, and screw in a special brass outlet which makes a watertight joint in the duct at exactly the spot desired for connection. It is claimed that the duct is immune from the corrosive effect that floor-fill materials have on metal, and that it is not subject to condensation effects. The system has been employed throughout the new Martins Bank headquarters at Liverpool. The fibre ducts, with socket and spigot joints, and with open bottoms, are laid on a concrete pad formed on the floor slab, the pad being covered with a strip of asbestos-bitumen sheeting. The junction boxes are of cast-iron, with brass inspection covers which are set to the floor level by means of elevating screws.

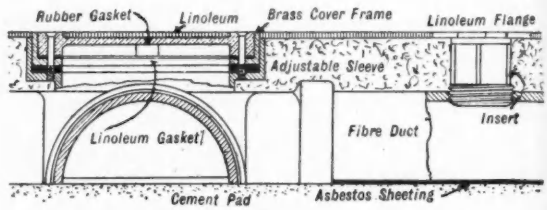


Fig. 4.—Arrangement of Duct Line and Fittings.

The covers are recessed to take the floor covering employed, so that only the polished brass rims are visible. Fig. 4 shows the arrangement of a single line of duct, with a four-way box and a brass inlet, in a floor with linoleum covering.

A Lamp-locking Invention.

We have received from Messrs. A. E. Moore and H. B. Wilkinson, "Moorside," Jubilee Road, Eston, Yorkshire, particulars of an invention patented by them which provides for the locking of ordinary b.c. lamps in their holders. The invention is embodied in the lamp cap, the design of which calls for only slight modification. Close to each lamp-cap pin there is cut in the metal casing of the cap, starting from the top, a right-angle slit, and within the angle the metal carries an outward corrugation, fig. 5. The idea is that when the lamp cap is inserted in the holder the corrugations are pressed inwards and slide under the skirting of the holder; when the lamp is turned to secure the b.c. connection the corrugations

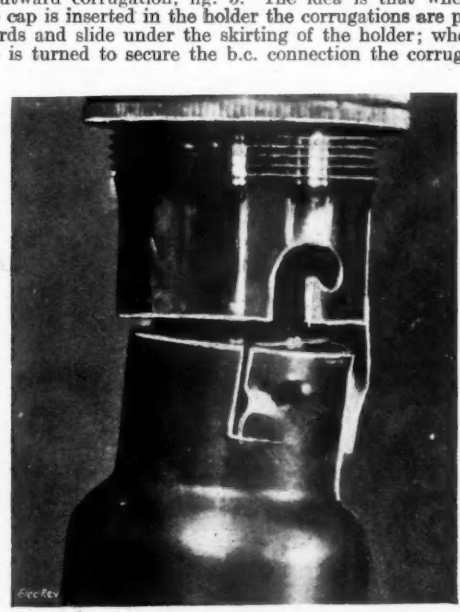


Fig. 5.—"Arrangement" of "M. & W." Lamp-locking Invention.

resume their normal positions, engaging the vertical slots of the holder, and so the lamp is effectively locked. To remove the lamp it is, of course, necessary to press the corrugations on the lamp cap inwards once more, and to do this a specially designed, but simple, double-pronged key is used.

Mid-East England Electricity Schemes.

Report of an inquiry held by the Electricity Commissioners' Inspector at Leicester last month.

A FOUR days' inquiry into applications made to supply electricity in parts of the three Midland counties of Leicestershire, Rutland, and Northants was concluded at Leicester on September 26th, the evidence and reports being left with Mr. Henry Nimmo, chief inspector to the Electricity Commissioners. The inquiry was held in a court room of the Leicester Town Hall, upon the walls of which were hung cartoons showing the plans of the Urban Electricity Company and of **Mr. R. Borlase Matthews,** whose application, having been made first, was dealt with before those of his competitors. The Mid-East England Electricity Special Order application, as Mr. Borlase Matthews' scheme was entitled, applies for powers to supply in an area comprising 584 sq. miles, which contains seventeen rural districts, about 13,000 occupied dwellings, and a population of about 55,000 persons, *i.e.*, 94 to the square mile. Mr. Borlase Matthews has already obtained similar powers in relation to parts of Lincolnshire; his project was opposed by several local authorities, the Leicestershire County Council, and by the Warwickshire, Leicestershire and Rutland Electric Supply Companies.

Mr. Craig Henderson, who put the case for this Order, argued that the scheme had been framed on lines identical with those recommended by the Commissioners themselves,* in that provision was made for the complete electrification of a rural area by means of assisted-wiring and hire-purchase schemes, multiple tariffs, and extensive educational propaganda. The fact that the area shared a border 36 miles in length with the southern limits of the area of the Lincolnshire Special Order made it possible for the two areas to be worked together with advantage, particularly in view of the fact that work in the new area, started before the completion of work in the Lincolnshire area, would increase the early assets of the company and give confidence to investors. The scheme allowed for the offering of supplies to 92 per cent. of the population; in fact, it was proposed to supply any village containing twenty houses without first demanding a guaranteed consumption from its inhabitants. At the commencement of the inquiry it was stated that thirteen of the Rural District Councils in the area had given their consents to the application, but before the inquiry terminated one of the four remaining councils (the Melton Mowbray Rural District Council) decided to withdraw its opposition. The Leicestershire County Council also supported this scheme.

Mr. J. M. Kennedy and the promoter, witnesses for the scheme, were examined at length, the evidence of the latter being the fruit of his personal experience of electro-farming and rural electrification. He suggested that, as his competitors only wished to have powers in certain small sections of his area, preference should be given to his more comprehensive application.

Mr. F. W. Wallis dealt with the case of the Leicestershire and Warwickshire Electricity Supply Company, making application for the westerly portion of the area, being a continuation of the existing area of supply of that company. He based his claims to the consideration of the Commissioners on the satisfactory past performances of the company, which was already supplying in 123 out of 260 parishes to the west of the area under discussion, although it was admitted that "not very many" farmers were included in the consumers, as its experience was, though it had several thousand farms in its area, that farmers were too conservative to consider supplies.

Mr. F. Thursfield, who has managed the company for the past eighteen years, gave technical and general evidence.

Mr. Sidney Turner applied, in the interests of the Kettering Electricity Supply Company, for an area to the south of the whole area, adjoining the present area of operation of the undertaking, and spoke of the progressive attitude of the company, which, beginning in 1904, had already built up a yearly sale amounting to 2,306,000 kWh (year ending March 30th, 1930) and was accustomed to multiple tariffs, assisted-wiring, and hire-purchase schemes.

Mr. Walker attested that, out of the many hundreds of farms in his area, he was now giving supplies to thirty in which a total of twenty motors was installed. In six years the number of consumers had nearly quadrupled and kWh sold nearly trebled.

Mr. Abady, appearing for the Urban Electricity Co. on behalf of an application (the Stamford Rural Electricity Special Order) to the south of Stamford, mentioned that he represented a company with wide interests all over the country and correspondingly wide experience, whose resources were such that there would be no difficulty in offering a supply, and which was associated with a purely rural scheme now being started in East Anglia. In Cornwall it was associated with the operation of a rural area.

Mr. A. J. Fippard mentioned in evidence that, as subscribers to the E.D.A., they were acquainted with, and users of, all publicity matter available from that source. He admitted that so far as rural areas were concerned experience had yet to be gained by his company, as time had not yet permitted the Cornish or East Anglian schemes to mature, but expressed progressive intentions with regard to rural electrification, offering, if the Commissioners so desired, to increase the area applied for now (without compulsory schedules). His companies had recently commenced to advocate the use of electric cookers. The introduction of a two-part tariff had proved to be far more popular than they had anticipated.

Mr. Craig Henderson, for the Mid-East Order, emphasised the consideration that the opponents were making no attempt to supply rural areas, but were yet endeavouring to increase their boundaries.

Mr. F. Oakley intimated on behalf of Uppingham and Gretton that the Council for the former district did not oppose the scheme with regard to the Gretton area, as Kettering wanted to supply Gretton and Rockingham only if there were reasonable demands.

Mr. Kennedy said that the cost of distribution with steel-cored aluminium conductors would be £375 per mile. To a suggestion that that was too low an estimate, he replied that the cost in the case of Kettering would be £335 per mile.

Mr. Borlase Matthews estimated that there were 6,000 farms in the area and 7,682 occupied dwellings, mostly small cottages for agricultural labourers. Questioned as to whether he thought the agricultural labourer was going to enter into a contract with him and let him wire his house, and pay him 2s. 6d. a month for eight years, Mr. Matthews said he had very strong hopes that he would. He was proposing to carry out thermal storage heating by a new method which would reduce the capital outlay very considerably, and he hoped that many farms would instal electric milking appliances. He did not think that such appliances would displace labour, for they would release skilled hands for other work on the farms. There was a very great difficulty about getting the necessary labour on farms, because milking meant trouble on Saturdays and Sundays, and much time would be saved by the use of electrical appliances, thus helping to solve the problem and giving the farmer more labour, which he so much needed. Electrification would lead to more intensive cultivation and would, he hoped, put farming in a position to reform itself. With regard to the Sowerby Council, his company was quite prepared to give an undertaking to purchase. He had a programme of developments, which meant that he would deal in steps with large areas without needing a guarantee.

In reply to **Mr. L. E. Rumsey,** who appeared for the Leicestershire County Council, Mr. Matthews said it was his idea to lay mains in advance of demands. It was better to take the supplies to the consumers than to wait for consumers to come to them for supplies.

On behalf of the Leicestershire County Council, **Mr. Victor Puchin,** the vice-chairman, supported Mr. Matthews' application so far as East Leicestershire was concerned. In cross examination he said there was no knowledge when the decision of the Council was arrived at of an application also being made by the Leicestershire and Warwickshire Power Company. The Council supported Mr. Matthews because its members thought he could supply electricity at a reasonable cost.

Mr. F. W. Wallis, for the Leicestershire and Warwickshire Power Co., said that the areas for which it was competing were the districts of Belvoir, Melton Mowbray, Barrow-on-Soar, Loughborough, Billsdon, Market Harborough and Hallaton. They had the assents of Barrow, Melton, Harborough, and an objection that no mains be placed above ground from Loughborough. Mr. Wallis quoted 7d. per kWh as being the company's effective price and referred to the fact that Mr. Matthews had mentioned 8d. as his price. Other competitors were the Kettering U.D.C., the Urban Electricity Supply Co., and the Stamford and Sowerby Light Co.

Mr. Rumsey asked whether the Commissioners did not always satisfy themselves on two points: the practical character of the scheme, and the financial capacity of promoters to carry it out.

Mr. Matthews said he believed that was always done.

In the main the arguments turned upon the interesting point whether it was really practicable to develop a rural area (for there are no towns in it of any size) along the lines of the recommendations of the Electricity Commissioners. Mr. Borlase Matthews claimed that it was definitely his policy to do so and the basic principle of his application was to demonstrate that it could be done. His competitors agreed in part, but pointed out that such schemes could only be applied gradually, accompanied by considerable caution: in fact, that they did not consider the farm load portion to be of any value.

The inquiry was closed and Mr. Nimmo will make his report in due course.

* "Considerations bearing upon the Electrical Development of Rural Areas," issued in March, 1930, by the Electricity Commissioners.

Municipal Tramways Association.

Report of the Twenty-ninth Annual Conference at Harrogate on Sept. 24th, 25th and 26th.

FOR several years it has been apparent that electric tramways have been of less interest at the congresses of the Association than formerly, and the increasing use of motor-'buses in municipal transport service led to the change of name of the Association to that of the Municipal Tramways and Transport Association. It has also, in recent years, been a feature of the congresses to have a large number of latest types of petrol-driven 'buses on demonstration. This year, as a matter of fact, the makers did not send their vehicles, but there were one or two 'buses driven by heavy-oil engines, representing the latest development in the field of transport where electric tramways may not be used economically. All tramway managers now recognise that there are spheres of utility for the electric tramcar, the motor-'bus (petrol or heavy-oil), and the trolley 'bus. We propose returning to this aspect in a later issue. Thus it was that at the Harrogate Conference this year the electric tramcar attracted less attention, so far as the actual Conference proceedings were concerned, than it has for some time, although there was the inevitable discussion of the electric tramcar *versus* the motor-'bus which the president (Alderman T. Canby, chairman of the Huddersfield Tramways Committee) endeavoured to cut short in the discussion on a paper by Councillor Gledhill. He found it impossible to do so, however, having allowed several speakers to unburden themselves on this topic before his intervention.

The headquarters of the Association during the conference were at the Majestic Hotel, Harrogate, and it was there that the Mayor and Mayoress of Harrogate (Alderman and Mrs. Annakin) informally received the members and their ladies on Tuesday evening, September 23rd, and on the following morning officially welcomed the Association.

Following the civic welcome, **Alderman T. Canby** gave his presidential address, to which reference is made in our leading columns.

Proposing a vote of thanks to the president for his address, **Bailie Peter Burt,** of Glasgow, took up the point of the relation between unskilled and skilled wages dealt with by the president, and expressed the hope that it would not be assumed that members of the Associatian were in favour of reducing the wages of tramway workers. He claimed that the Glasgow transport system had met with its great measure of success by reason of the high wages paid to the workers.

The seconder of the vote of thanks (**Councillor A. E. Pate,** of Ramsbottom) took the same view, as did several Councillors.

The President, acknowledging the vote of thanks, said he was pleading for equality of wages, and was expressing only what a good many people thought.

Among the visitors to the Congress were M. Frederic de Lancker and M. Andre de Becker (president and general secretary, respectively, of the International Union of Tramways, Light Railways and Public 'Bus Transport).

M. de Lancker, bringing the greetings of the International Union, said that his executive was disappointed that there was such a small British representation at the congresses of the International Union, there being only one or two delegates from Great Britain at the last conference at Warsaw. It was assumed, he said, that the language difficulty was the reason for this, and he added that, subject to the matter of cost being adjusted, the executive of the International Union would be willing to adopt English as a third official language, in addition to French and German. He intimated the possibility of arranging something on the lines of the plan adopted at Berlin this year at the World Power Conference, where a person was able to sit at his desk in the Congress Hall and listen through a telephone to a speech in English whilst it was being delivered in French or German. Finally, M. de Lancker extended a cordial welcome to all British managers and others who cared to attend the special meeting of the International Union in Paris in October to discuss the subject of regeneration of current on electric tramcars. He indicated that special experiments had been carried out in Paris and Marseilles, and that during the Paris meeting in October there would be an opportunity of witnessing demonstrations of a new type of motor that had been devised, and by the use of which it was claimed that the cost for electrical energy could be reduced by 25 per cent.

The annual general meeting of the Association was then held. The Council's report was adopted after further expressions of opinion to the effect that the Association must not be regarded as being in favour of a lower standard of wages for tramway workers. In the same way, the accounts were adopted, a credit balance of nearly £500 being shown. Ex-Alderman Higham (Blackburn) and Mr. H. Mozley (recently retired from the general managership of the Burnley Corporation Tramways undertaking) were elected honorary members.

The election of officers and members of council for 1930-31 then took place, with the following result :—

President, Mr. R. S. Pilcher (general manager, Manchester); vice-president, Alderman A. G. Ellaway (Birmingham); hon treasurer, Mr. A. R. Fearnley (general manager, Sheffield); hon. solicitor, Mr. F. H. C. Wiltshire (Birmingham); members of council, Alderman W. Greenwood (Salford), Alderman George Hill (Burton-on-Trent), Mr. C. Furness (general manager, Blackpool), Mr. C. Jackson (general manager, Plymouth), Mr. C. Owen Silvers (general manager, Wolverhampton).

On Wednesday afternoon, September 24th, a paper was read by **Councillor A. H. Gledhill** (chairman, Halifax Corporation Tramways and Motor Omnibus Committee) entitled "The Transition in Road Passenger Transport, with Special Reference to the Changes that have taken place between 1928-1930."

The discussion hinged a good deal on the question of tramways *versus* motor-'buses, and for the rest dealt mainly with motor-'bus problems. We give below a few notes of special interest from the tramway point of view.

Mr. R. S. Pilcher (general manager, Manchester) remarked that in many places where reconstruction of track was involved, it would be found more economical to abandon tramways altogether and adopt motor-'buses, as had been proved to be the case on some routes in Manchester.

Mr. R. H. Wilkinson (general manager, Bradford) said he saw nothing in the paper which indicated that the tramway could hold its own with either the trolley 'bus or the petrol 'bus; he would go so far as to say that in ten years' time there would hardly be a tramcar in Great Britain.

Councillor J. H. Whitaker (Todmorden), whilst not suggesting that all tramways should be scrapped, contended that where reconstruction was necessary, the adoption of motor-'buses must seriously be considered.

Mr. J. Barnard (general manager, Bolton) claimed that tramways were solvent, and were likely to be for a long time, when run in an up-to-date manner. When Mr. Pilcher spoke of scrapping tramways in Manchester he did not mention that on the particular route, before the substitution of 'buses, the tramcars were a disgrace to the City of Manchester. On the Altrincham route, the railway company was electrifying its line, and he believed that when this was working it would supersede both the tramcars and the 'buses. A great deal had been said about the relative speeds of the tram and the 'bus, but when both were working to the same schedule there was little difference.

Mr. W. R. Elliott (general manager, East Ham) mentioned an instance in his area which he claimed indicated that an up-to-date tramway could hold its own with a modern 'bus service. On one route there were 120 'buses passing any particular point per hour, and the tramway receipts had dropped to 11d. per car-mile, whilst the expenses had gone up to 14d. per car-mile. By putting on modern cars and increasing the speed and comfort, the traffic had been got back to such an extent that the revenue had gone up to 17d. per car-mile and the expenses had fallen to 11½d.

Alderman W. Greenwood (Salford) said the reason why so much expense was involved in track reconstruction was the wear due to the heavy lorry and other traffic which had not been anticipated when the tracks were laid 20 years ago.

Mr. C. Furness (general manager, Blackpool) agreed with the author that the present system of costing on a car-mile basis was fallacious, and suggested that the executive council should endeavour to devise a formula which would bring fixed charges and running charges into a proper relationship, so that a better comparison might be made of various undertakings.

Bailie P. J. Dollan (Glasgow) strongly urged transport committees to give full authority to their managers and not to interfere in matters of detail and management. He also spoke with great emphasis in favour of large transport areas, and, on the question of how 'bus competition could be met by modern tramways, said that last year in Glasgow the tramway receipts had increased by over £100,000, despite the competition of 1,300 private 'buses and 200 Corporation 'buses. This demanded up-to-date methods and equipment.

The author replied at some length, and maintained that tramways should not be abandoned.

In the afternoon of Thursday, September 25th, a paper was read by **Mr. W. Vane Morland** (general manager, Walsall Corporation Tramways and Motor Services) entitled "Progress made with the Development of the Heavy-oil Engine." This indicated the vast amount of successful development work that had taken place in heavy oil-engines which were running at Sheffield, Leeds, and Walsall.

On Friday, September 26th, a visit was paid to Huddersfield, where luncheon was provided by the Huddersfield Tramways Committee, and afterwards to Leeds, where the party was entertained to tea by the Leeds City Tramways and Transport Committee.

The annual dinner of the Association was held at the Majestic Hotel, Harrogate, on Wednesday, September 24th, the principal guest being Mr. Herbert Morrison (Minister of transport). **Mr. Morrison,** in the course of a long speech, dealt with the changes that will come into effect through the passing of the Road Traffic Act, 1930.

Institute of Fuel.

Report of visits to the Barking and Deptford Power Stations and H.M. Fuel Research Station, Greenwich.

A VERY instructive and enjoyable day was spent on Thursday of last week by 150 or so members and friends of the Institute of Fuel who visited the Barking power station of the County of London Electric Supply Co., Ltd., H.M. fuel research station at East Greenwich, and the Deptford generating stations of the London Power Co., Ltd. The visits were arranged by the Institute with the object of enabling members to obtain first-hand information from the inspection of both pulverised-fuel-fired and stoker-fired boiler installations, together with experimental work which is being carried out in connection with fuel research, in view of the controversy which has arisen over the respective merits of powdered-fuel and mechanical-stoker firing.

The party proceeded by river steamers from Westminster Pier, and, after viewing from the river the new Ford motor works now under construction at Dagenham, landed at the Barking station, over which groups were conducted by members of the staff. This station, which has now an installed-plant capacity of 240,000 kW, was formally put into commercial service by H.M. the King in May, 1925. The steam-generating plant consists of two separate installations, one of stoker-fired equipment in No. 1 boiler house, and the other, in No. 2 house, utilising pulverised fuel. No. 1 house contains 12 boiler units and four combined steam-reheater and boiler units; two of the last-mentioned, however, have not yet been fitted with the reheating equipment and are at present operated as ordinary boiler plant. Six of the boiler units and the two completed reheater sets are of Babcock & Wilcox design, and the other eight are of Yarrow design. The main boiler units are each designed for a normal evaporation of 68,000 lb. per hour. The boiler section of each combination installation is designed to give a normal evaporation of 44,000 lb. per hour, and the reheater section is designed to deal with 165,000 lb. of steam per hour at normal load, and to reheat it from between 350 and 450 deg. F. to 725 deg. F. No. 2 boiler house is equipped with ten p.f. boiler units, each with a rated capacity of 135,000 lb. per hour. The whole of the p.f. plant, including the buildings and auxiliaries, was supplied by International Combustion, Ltd., and it incorporates the Lopulco storage system of firing. Drying of the coal is effected by passing flue gases through the mills. Practically the whole of the output from Barking during the past six months has been produced from the p.f. equipment, using coal of about 10,500 B.th.u. calorific value. The coal-consumption figure varied from 1.4 to 1.45 lb. per kWh sent out, with an overall efficiency of from 22 to 22.2 per cent. It was very interesting to learn that during the last two years there have been deliveries of particularly bad coal, below 9,000 B.th.u. and rich in ash, which had been burned without the operators being aware of the poor quality. Dust and dirt are much in evidence at Barking, but it should be remembered that the p.f. plant is five years old in design.

After the inspection of the Barking station the members re-embarked on the steamers and left for the fuel research station, luncheon being served on board *en route*. The members were received at Greenwich by Dr. C. H. Lander, director of fuel research, who explained the work undertaken at the station for fundamental research on the development of pulverised fuel, supporting his remarks by the experimental production of vortices in liquid and air, so as to demonstrate the application of the principle to short-flame burners. Three experimental burners were shown in actual operation; the vortex combustion chamber, in which the air employed for combustion is caused to take up a spiral vortex motion by passing it over specially-designed guiding vanes; the impinging-jet combustion chamber in which a vortex motion is produced by causing two equal opposed streams of air to impinge directly upon one another on the axis of a cylindrical chamber; and the grid burner in which the primary air and fuel mixture is passed through a number of narrow slots so as to form a number of thin parallel sheets of fuel and air, and between these sheets are introduced similar thin sheets of preheated air. Dr. Lander pointed out that in the experimental apparatus there was a heat release of something like half-a-million B.th.u. per hour.

Various types of commercial p.f. burners were on view at the research station, as were also the two boilers large enough to be considered representative of commercial practice which have recently been equipped for p.f. firing. One boiler is of B. & W. manufacture and rated at 5,750 lb. per hour, and the other is a Thompson Lancashire boiler.

The next important item on the programme was the visit to the Deptford stations, where the visitors were welcomed by Mr. A. H. Ellis. The Deptford (West) station is the latest one built by the London Power Co., and is designed for an ultimate capacity of about 190,000 kW. At present four turbo-alternator sets and twelve boilers are in normal operation, while a fifth generating unit and two additional boilers are under construction. Eight of the boilers are of 75,000-lb.-per-hour normal economical rated output, four B. & W. and four Stirling, while the remaining four, two of each make mentioned, have each a normal economical capacity of 100,000 lb. per hour. The two new boilers will be of the John Thompson "Beta" 6-drum type, each capable of evaporating normally 160,000 lb. per hour (e.r.). With the exception of two of the 75,000-lb. Stirling boilers, which are fired by Erith Roe retort stokers, and the two new J. Thompson boilers, which are to be fitted with Taylor retort stokers, the Deptford West boilers are all fired by means of B. & W. chain-grate stokers. The operating steam conditions are 375 lb. per sq. in. and 780 deg. F. There are at present under normal operation twenty boilers arranged in one boiler house, while a second boiler house is now being built with provision for eight additional boilers, two of which are under construction. Thirteen of the existing boilers are of 50,000 lb. per hour normal rated output, eight B. & W. and five Stirling, while seven are of 64,000 lb. per hour normal rating, six Stirling and one Yarrow. The two new boilers will be of Stirling manufacture, and each will have a normal economical rating of 200,000 lb. per hour. Twelve of the boilers are fitted with B. & W. chain-grate stokers, two with the Underfeed Stoker Co.'s "A" type stokers, two with underfeed "L" type stokers, and three with Taylor retort stokers. The two new boilers will be fitted with underfeed "L" type stokers. It was very interesting to learn that very little difference had been experienced between the operation of the chain-grate and retort stokers; both had shown on test an efficiency of 88 per cent. on the gross calorific value of the fuel, 10,500 B.th.u. At Deptford East, where the latest type of retort stokers are used, a minute-to-minute variation in steam demand of between 200,000 and 300,000 lb. is met successfully. The new stokers (Taylor Stoker Co., Ltd.) are believed to be the first to be put into commercial operation in this country. The overall thermal efficiency of Deptford West is over 23 per cent. The absence of smoke and dust at Deptford is particularly marked, and the comparison afforded between Barking and Deptford was very interesting. At the time of the visit both the Deptford stations were loaded at 50,000 kW, and the stacks were very clean indeed.

Re-embarking at Deptford at about 5 p.m. the party left for the return to Westminster Pier, tea being served during this last stage of the trip. The members then assembled at the Institution of Electrical Engineers, where a very interesting and fruitful discussion took place on the subject which promoted the visits of the day. We propose to publish a report of the discussion in a later issue.

Correspondence.

Correspondents should forward their communications as early as possible. *No letter can be published unless we have the writer's name and address in our possession.*

The Drumm Battery.

In his rambling contribution to the lighter side of the REVIEW of September 19th, Mr. Tweedy gives us some further gossip on the Drumm battery, and in the third entertaining instalment of this divergent series he will no doubt apologise for leg pull number two, and discuss its relationship with leg pull number one.

Beyond his extracts from the official reports published by the Ministry of Industry and Commerce, the only statement he makes concerning the Drumm battery that has any semblance of fact is his enlightening suggestion that perhaps there is "some little thing in the electrolyte."

Mr. Tweedy would do well to stick to his usual literary line, but if he must change his style it would appear that "Old Moore's Almanack" would be a more suitable medium.

Tweedledum.

September 22nd, 1930.

I have allowed a week to elapse expecting to see some letters commenting upon Mr. Tweedy's article in your issue of September 19th, but apparently no one has protested.

Mr. Tweedy has surely kissed the "blarney stone." He has obtained about eight columns of publicity for this battery, and has also proved the statement that "language is a device invented to conceal meaning." He has achieved the feat of evading in some five thousand words disclosure of the one fact we are really interested in, *viz.*: the discharge in watt-hours per lb. at, say, three rates, 1 hour, 2 hour, and 3 hour. Instead he has, or the inventors have, invented a new gauge, watt-hours per lb. per hour.

He almost suggests that the Irish Free State has just originated the idea of a boosting charge—known to the first man who ran an electric cab 35 years ago—and probably before that.

Until we know the watt-hour discharge per lb. at three rates it cannot be said that the Drumm battery is light enough to be of use for the obvious purpose for which it would be used (electric vehicles)—if it were a success. The inventors are not acting scientifically in carrying out tests of a cell and rail vehicle as a unit. Test the cell by itself and publish the simple figures and any traction engineer can calculate its

performance not only on the rail but elsewhere, either with or without boosting charges! I am surprised that in 1930 such methods and figures as those described by Mr. Tweedy can be "put over" as a description of a new accumulator without raising serious protest. I have been asked what I think of the Drumm battery and have so far had to say that the figures given indicate the similarity between the name and the value of the contents of the articles so far published upon it.

W. Fennell.

Northwich, *September 29th*, 1930.

Young Engineers for Abroad.

I am sorry to see that you have not, as yet, published any replies to "Eee Bee's" letter in your issue of September 5th, for the question of employment abroad must be of interest to many British engineers, whether Englishmen or, like myself, Colonials, who have received their engineering training in this country and wish to return home. Your suggestion for the formation of an advisory bureau is very sound, and I hope that it will receive practical support from one or more of the big engineering associations.

To turn from the general question to your correspondent's own case, I have been trying for some time to obtain a reasonably good position in South Africa, and can claim a certain knowledge of the situation of that country. If "Eee Bee" is averse to taking up supply or sales work, he had better remain in England, as there is no manufacture of electrical plant in South Africa at present. The country, though rich in mineral deposits, is primarily agricultural, and the policy of successive governments has been to subsidise agriculture at the expense of industry. In consequence, the expansion of existing industries has been largely checked, while the capital required to establish new ones is not forthcoming. Times must change, and in 10 or 15 years' time there may be a demand for men with manufacturing experience, but there is none at present.

As regards the other branches of electrical work, the supply of electricity is in the hands of the Victoria Falls and Transvaal Power Company, the various corporations and municipalities, and the Government Electricity Commission. There are doubtless occasional vacancies in this branch, but it must not be forgotten that they can usually be filled by promotion, and that the South African Universities turn out every year a comparatively large number of young engineers with an excellent technical training. I assume that "Eee Bee" has investigated the possibility of securing a position on the South African sales staff of his own firm, and is either insufficiently interested in sales work or unable to get a satisfactory offer.

So much for opportunities in the electrical profession. I notice that farming is suggested as a possible alternative, but I cannot stress too strongly the inadvisability of taking up farming in South Africa without a considerable reserve of capital. Further discussion of this subject would hardly be of interest to the majority of your readers, and I must therefore confine myself to the foregoing warning.

There are two other points to be noted. First, the cost of living is, on the whole, higher in South Africa than in England, the figure varying according to the place of residence. For example, a married man requires a minimum of about £550 per annum to live comfortably in Johannesburg, although living in other towns is admittedly somewhat cheaper. Secondly, bilingualism—far less a practical necessity than a political fetish—is a prescribed qualification for Government appointments. This need not deter the average man, as a working knowledge of Afrikaans may be acquired in a few months, but the fact is not without interest, and throws some light on other aspects of the local situation.

As regards the rest of the Empire, Australia will obviously not be offering lucrative opportunities for some time to come. Canada is presumably well supplied with engineers, and India's future is uncertain. If "Eee Bee" is bent upon going abroad, I would suggest that he investigates the opportunities in New Zealand or Northern Rhodesia.

Afrikander.

London, *September 23rd*, 1930.

Electrical Machinery for Ships.

Many manufacturers of electrical apparatus, even those doing an extensive marine business, may not yet have envisaged a situation with which they will in all likelihood be confronted next year. The provisions of the recent International Convention for the Safety of Life at Sea (1929) will then be put into force. Of these, Article 47 provides that every ship of 5,000 tons gross tonnage and upwards shall be provided with approved wireless direction-finding apparatus, in accordance with Article 31, Clause 17. The latter states that the apparatus "shall be efficient and capable of receiving clearly perceptible signals . . ."

The extent to which signals are clearly perceptible to such apparatus obviously depends on how much local disturbance, or noise, is picked up by the amplifier; direction-finder makers claim that their modern instruments are so shielded as to be entirely undisturbed by the electrical effects radiated from the ship's wiring, by sparking at motor and dynamo commutators, periodic contact-making, as in the electric clock or log, and so forth. But anyone with experience of ship work knows the trouble to which wireless engineers often put themselves, in new ships, to eliminate local disturbance.

At present the onus of obtaining clear reception is on the wireless engineers; directional wireless, with all its advantages, is in the luxury category, and if it fails to "receive" the shipowners will not buy it. In the future, however, backed up by G.P.O. inspection, the wireless contractor will have it all his own way, empowered to condemn all and sundry pieces of apparatus alleged to disturb the reception of signals.

There is no excuse for sparking at commutators; but the complaint may not end there, a machine or instrument may be condemned on fundamental grounds. Even the location of electrical gear near the wireless room may demand alteration. Certainly, much will be said about the running of extraneous cables in that neighbourhood. Makers of electrical machinery may thus find themselves helpless, forced to replace or modify their gear on the eve of a ship's departure. For the contractor responsible for the ship's wiring the case is unquestionably as bad, or worse.

This is a matter on which it would be interesting to have the views of the profession.

A.M.I.E.E.

September 23rd, 1930.

A Small-motor Problem.

A few weeks ago I received for repairs the small armature of a "Brum" vacuum cleaner. I decided to rewind the armature, and, having done so, I put the motor on test and noticed that an arc, quite one inch in length, was leading, not trailing from, each brush. The arcs did not travel with the commutator, but at an angle to it.

The field coils test out correctly, as does the armature, which is lap wound, with twelve slots, twenty-four commutator segments, and a coil pitch of six. I have rewound the armature several times, using different methods of winding, but the result is the same in each case. The supply for test is 200 volts, single phase, 50 cycles, and the machine is designed to run on either a.c. or d.c.

I have rewound dozens of small armatures for both a.c. and d.c., but never before have I experienced such a difficulty. Perhaps the matter will interest some reader who may be so kind as to suggest a remedy.

H. Bush.

St. Leonards, *September 23rd*, 1930.

That Better Job.

The letter of "Another Corporate" in the "Correspondence" columns of your issue of September 19th is interesting, and to a great extent sums up my own experience. "Another Corporate's" suggestions with regard to training employers how to engage men are good. I think there are two points to which employers might give their consideration, points which would certainly save them and applicants a great deal of trouble, time, and worry.

When advertising a vacancy most advertisers ask the applicant to state the salary he requires. This, in my opinion, is a mistake. Why cannot the would-be employer state definitely what salary he is prepared to pay? By adopting this procedure advertisers would certainly have less correspondence to deal with, and engineers seeking new positions would know exactly what they were applying for.

The second point is one which I believe has been raised in your columns before, but I think it is worthy of repetition—I refer to the apparent lack of courtesy of the great majority of employers who neither acknowledge receipt of, nor answer, applications for vacancies. The methods adopted by Government departments form a very good object lesson to such employers. A little courtesy extended to applicants would ease some of the worries faced by all of us.

Chartered Electrical Engineer.

September 30th, 1930.

Electricity for the Home.

Our attention has been drawn to the article by "E.M.H." entitled "My Lady's Pleasure" in the issue of your paper for September 19th.

Although it is clear to us from your editorial that you are not in agreement with one or two of the points in the article, we cannot help feeling that the publication of any matter likely to cast a doubt upon the satisfactory behaviour and operation of domestic electrical appliances does not tend to assist the industry generally.

At such meetings as those organised by the British Electrical Development Association the manufacturer is fair game for destructive criticism, and it is only on extremely rare occasions that anyone troubles to get up at such meetings to give a word of praise. We think, however, it is rather a mistake that such things are put into print, as, although one does not doubt for a moment that "E.M.H." has written in good faith, it is obvious that with 70,000 to 80,000 electric cookers in use in this country to-day she has not much backing. One firm alone in this industry is turning out electric cookers at the rate of

10,000 a year in spite of unbiased criticisms from time to time from within the electrical industry.

To deal specifically with the matter which affects us, *i.e.*, the electric cooker, possibly "E.M.H." has not grasped the fact that electric cookers are a little different from ordinary gas cookers and require, for instance, slightly different utensils. We do not wish in this letter to go into detail, but the correct utensils would overcome minor objections.

We consider that the most serious point is her suggestion that the electric oven will not cook, and that is really what she means when she says that food is apt to look anæmic. "E.M.H." cannot think seriously that the thousands of housewives using electric cookers to-day are satisfied with pies which do not possess the tempting brown and flaky appearance which is rightly valued.

It should be borne in mind that 75 per cent. of the output of electric cookers goes to the lower middle classes, where the whole care of the house and children, as well as the cooking, devolves on one woman. This does not suggest the "long forethought," &c., which "E.M.H." considers so necessary to get the best results with an electric cooker.

Jackson Electric Stove Co., Ltd.,
S. C. Hurry, *Sales Manager.*

London, S.W.1, *September 23rd.*

[We refer to this letter in our "Electricity for the Home" section.—Eds. Elec. Rev.]

Testing Installations.

We often read in the Electrical Review about the moral obligations of the supply companies towards consumers with regard to the connection of old or new installations, but it would be interesting to know how far a company is entitled legally to enforce such regulations.

A company or corporation usually has its own rules, or abides by the I.E.E. Regulations, and the average consumer is perfectly prepared to make his builder or contractor abide by them, but the occasion sometimes arises when he refuses to believe in the company's power to enforce a particular rule, such as for bonding or earthing, or when a low test is made out to be due to dampness; when legal proceedings are threatened, the companies usually give way, even to the extent of connecting faulty installations, rather than face the doubtful result of such proceedings.

Another cause of trouble is the connection of the old installation which has perhaps only been disconnected the day before, but proves to be faulty. The consumer naturally points out that as it was being used the day before why can't he use it too? Has a company the right to refuse connection?

I should like to hear your correspondents' views as to the position of both companies and corporations which may, or may not, have their own Acts (often not legally enforceable). How many of these are legal besides those of the Board of Trade dealing with maximum leakage allowable, &c.?

Legally Interested.

September 23rd, 1930.

The Minimum Charge.

Undertakers have the statutory right to make a minimum quarterly charge, and there are doubtless many cases in which it is justified, but sometimes it becomes an absurdity.

The garage of my house is over a road. It is wired for two lights and has a service board, &c., but the connection to the main is direct and not from the house. I informed the Chichester Corporation (the undertaker) that, as the service was laid for the previous owner, I should be glad to have it connected up; but that, as my consumption could not possibly be more than a few kWh per annum, I could not see my way to pay a large minimum charge, plus a meter rent, in itself greater than the possible revenue.

Although the household uses both light and power extensively, the worthy City Fathers declined to meet me; and their service is, and will remain, unused. One candle does all I require. Could futility go further?

J. W. Meares.

Chichester, *September 26th*, 1930.

Published Specifications.

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specification will be printed and abridged, and all subsequent proceedings will be taken.

1929.

10,259. "Automatic transmitter particularly for teaching telegraphic and radio-telegraphic signalling." M. Papalia. April 2nd, 1929. (334,498.)

10,700. "Microphones." Siemens & Halske Akt. Ges. April 7th, 1928. (309,191.)

13,839. "Electric discharge tubes." S. G. S. Dicker (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). May 3rd, 1929. (334,519.)

14,427. "Television receivers." Universal and General Radio Co., Ltd., and L. M. Myers. February 10th, 1930. (334,505.)

14,899. "Primary and secondary electric batteries." M. Holbrook (*née* Nocenzo). February 27th, 1930. (Convention date not granted.) (314,010.)

16,786. "Tape or wire for loading electric conductors." Standard Telephones and Cables, Ltd., G. Lawton, and W. H. Dearen. May 31st, 1929. (Cognate application, 31,400/29.) (334,547.)

16,816. "Automatic telephone systems." Siemens Bros. & Co., Ltd., and D. A. Christian. May 31st, 1929. (334,524.)

16,835. "Radio broadcasting systems." Kolster Brandes, Ltd. (Kolster Radio Corporation). May 31st, 1929. (Convention date not granted.) (312,696.)

16,851. "Magnetic tachometer." A.C. Spark Plug Co. June 20th, 1928. (313,954.)

16,979. "Sound recording." Lissen, Ltd., and C. W. Oatley. June 4th, 1929. (334,576.)

17,086. "Telephone systems." Associated Telephone and Telegraph Co. December 24th, 1928. (334,534.)

17,242. "Electric protective systems." A. Reyrolle & Co., Ltd., and H. Leben. June 5th, 1929. (334,549.)

17,254. "Telephone systems." Standard Telephones and Cables, Ltd., and E. P. G. Wright. June 5th, 1929. (334,578.)

17,277. "Electromagnetic gramophone pick-ups or recorders." British Thomson-Houston Co., Ltd., and A. Bowen. June 5th, 1929. (334,551.)

17,299. "Submarine cable conductors." Western Electric Co., Ltd. (Bell Telephone Laboratories, Inc.). June 5th, 1929. (Patent of addition not granted.) (334,553.)

17,406. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd., O. A. Fearce, and L. M. Simpson. June 6th, 1929. (334,584.)

17,427. "Electrical insulating materials." W. S. Smith, H. J. Garrett, J. N. Dean, B. J. Habgood, and H. C Channon. June 6th, 1929. (Addition to 329,275.) (334,587.)

17,606. "Electric switchboards, more particularly for galvanic electromedical apparatus." G. Wohlmuth & Co. Akt. Ges. May 6th, 1929. (334,599.)

17,610. "Directional wireless system for indicating the position of vessels." C. Lorenz Akt. Ges. January 24th, 1929. (334,600.)

17,637. "Earthing of electrical apparatus." W. Brooke. June 8th, 1929. (334,602.)

17,680. "Diaphragms for loud-speakers, telephones, microphones, and the like." H. Vogt. June 8th, 1929. (334,605.)

17,681. "Sound-receiving and reproducing apparatus." H. Vogt. June 8th, 1929. (334,606.)

17,682. "Electrostatic loud-speakers, microphones and the like." H. Vogt. June 8th, 1929. (334,607.)

17,687. "Searchlights." Siemens-Schuckertwerke Akt. Ges. and F. Kalkner. June 8th, 1929. (334,608.)

17,894. "Electromechanically-driven vehicles." British Thomson-Houston Co., Ltd. June 12th, 1928. (313,496.)

17,937. "Electric ovens." L. W. Wild and Wild-Barfield Electric Furnaces, Ltd. June 11th, 1929. (334,621.)

17,966. "Cathode-ray tubes." Associated Telephone and Telegraph Co. June 18th, 1928. (313,882.)

18,082. "Electric accumulators." I. G. Farbenindustrie Akt. Ges. June 12th, 1929. (Addition to 311,401.) (334,628.)

18,487. "Production of carbonaceous coatings upon metallic bodies for use in electron-discharge devices." A. S. Cachemaille (Westinghouse Lamp Co.). June 15th, 1929. (334,633.)

18,633. "X-ray apparatus." S. Cox. June 17th, 1929. (334,639.)

18,875. "Oil-filled long-distance communication cables and apparatus associated therewith." Siemens-Schuckertwerke Akt. Ges. June 28th, 1928. (Addition to 301,876.) (314,495.)

19,176. "Electrostatic telephone receiving instruments." G. Mache. April 30th, 1929. (334,643.)

19,232. "Alternating-current phase-splitting systems." D A. Oliver. June 22nd, 1929. (334,644.)

19,642. "Protective arrangements for electric circuits." British Thomson-Houston Co., Ltd. June 27th, 1928. (314,437.)

20,056. "Telephone and like transmission systems." A. D. Blumlein. June 29th, 1929. (334,652.)

20,986. "Thermionic valve systems." Victor Talking Machine Co. September 1st, 1928. (318,235.)

24,047. "Electrical switches." S. Ruppel. August 6th, 1928. (316,952.)

24,925. "Telegraphic systems." C. Lorenz Akt. Ges. February 6th, 1929. (334,686.)

25,384. "Electromagnetic acoustic devices." Gramophone Co., Ltd., H. White, and E. M. Payne. August 20th, 1929. (334,691.)

27,325. "Production of plates for electric storage batteries and accumulators." G. F. Judd and J. Carlier. September 9th, 1929. (334,711.)

27,433. "Electrically-operated apparatus applicable to advertising signs." V. Powell. September 10th, 1929. (334,712.)

28,642. "Electric switches." F. Whipp, Whipp & Bourne, Ltd., and Mather and Platt, Ltd. September 21st, 1929. (334,721.)

29,771. "Connecting lead devices for electric apparatus." E. Koska (trading as W. & G. Kessler). June 6th, 1929. (334,739.)

30,631. "Jointing for sparking plugs." Siemens & Halske Akt. Ges. February 23rd, 1929. (334,748.)

30,934. "Containers for electric condensers." Telephon-Apparat-Fabrik E. Zwietusch & Co. Ges, November 3rd, 1928. (334,752.)

32,250. "Oscillation generating systems." Telefunken Ges. für Drahtlose Telegraphie. November 2nd, 1928. (334,765.)

33,402. "Electric circuit controlling devices." British Thomson-Houston Co., Ltd. November 3rd, 1928. (334,775.)

34,044. "Fastening device for overhead wires." Siemens-Schuckertwerke Akt. Ges. November 8th, 1928. (334,780.)

35,258. "Radio communication systems." Marconi's Wireless Telegraph Co., Ltd. November 17th, 1928. (334,789.)

35,552. "Mercury-break electrical switches." L. Flandrin and G. C. Levy. November 22nd, 1928. (Addition to 305,471.) (334,793.)

36,656. "Ignition devices for internal-combustion engines." British Thomson-Houston Co., Ltd., L. Griffiths, and C. J. Morton. November 29th, 1929. (334,802.)

39,063. "Trunk communicating electric cables of high capacity." Siemens-Schuckertwerke Akt. Ges. January 8th, 1929. (Addition to 304,799.) (334,814.)

1930.

181. "Röntgen-ray apparatus." Siemens-Reiniger-Veifa Ges für Medizinische Technik. February 23rd, 1929. (334,818.)

935. "Electrically-heated curling tongs." R. Bosch Akt. Ges. January 21st, 1929. (334,822.)

4,440. "Control device for the electrical driving mechanism of phonographs." Etablissements Igra. February 9th, 1929. (334,825.)

6,548. "Apparatus for receiving pictures or messages." British Thomson-Houston Co., Ltd. March 27th, 1929 (334,827.)

8,171. "Magnetic clutches." Siemens-Schuckertwerke Akt. Ges. March 22nd, 1929. (334,829.)

20,312. "Device for the periodic opening or closing of an electric circuit." Siemens Bros. & Co., Ltd., and H. E. Humphries. April 29th, 1929. (Divided application on 334,205.) (334,516.)

Trade Mark Applications.

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from September 24th:—

Eltax. No. 509,656. All goods in Class 8.—Eltax Elektro Gesellschaft, Berlin. (British representatives: Edward Evans & Co., 27, Chancery Lane, W.C.2.)

Durium (lettering and design). No. 515,589. All goods in Class 8.—Durium Products Corporation, New York. (British representatives: White, Langner, Stevens, Parry & Rollinson, 5-9, Quality Court, Chancery Lane, W.C.2.)

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

ABERGELE.—Children's home; Denbighshire Public Assistance Committee.

AYR.—School for advanced pupils; clerk of works, Education Authority.

BAKEWELL.—Extensions, isolation hospital, for Haddon Joint Hospital Committee; C. Flint, architect, The Quadrant, Buxton.

BARKING.—Shop premises, East Street and Broadway Corner; Montague Burton, Ltd. Shops, flats and garages, Longbridge Road; F. W. Albon. Erection of Campbell School (£42,469); Unit Construction Co., Ltd.

BATH.—Schools, Southdown (£28,000), for the E.C.

BECONTREE.—Houses, L.C.C. estate (£2,187); L.C.C. architect.

BEDFORD.—Buildings, London Road; E. H. C. Inskip and Son, architects.

BIRMINGHAM.—Cinema, Tyburn Road and Gravelly Hill; W. E. Salt, accountant, Stock Exchange Buildings, Great Charles Street.

BISLEY (Stroud).—R.C. church; Rev. D. Sargent.

BRIGHTON.—Houses (30), Rottingdean estate (£11,595); Building and Public Works Construction Co., Ltd. Houses (197), Whitehawk Valley estate; borough engineer. Extensions, St. Mary Magdalen schools, Upper North Street; Very Rev. Mgr. G. Wallis. Elementary school, Whitehawk Valley, for the E.C.

BROMSGROVE.—Re-erection of saw mills and joinery works (£10,000) for J. & A. Brazier, Ltd.

BURSLEM.—Estate development, Chatterley Street; Chatterley Whitfield Collieries, Ltd.

CARLISLE.—Extensions, county offices, for Cumberland C.C.; J. Forster, county architect.

CHESTER.—Development, Lache housing estate; city engineer.

CHORLEY.—Baths (£20,000); Percy Howard, architect.

COLWYN BAY.—Premises for County Public Assistance Committee; county architect, Denbigh.

CRAYFORD.—Houses (80) for the U.D.C.; surveyor.

DURHAM.—Houses (32) for the R.D.C.; surveyor.

FALKIRK.—Public baths (£19,000), East Ward; burgh surveyor.

GATESHEAD.—Tailoring factory warehouses, &c. (£25,000); Messrs. Jackson, Clayton Street, Newcastle.

KIDDERMINSTER.—Works extensions, Mill Street, for Carpet Trades, Ltd.

KINGSWINFORD.—Houses (52) for the R.D.C.; surveyor.

LANCASHIRE.—Grammar school, Whitefield (£48,000); director of education, County Education Offices, Preston.

LEEDS.—School, Horsforth; director of education, Education Offices, Calverley Street.

LONDON (Hackney, E.).—Extensions, Metropolitan Hospital; Young & Hall, architects.
(Wapping, E.).—School (460 places), Tench Street; L.C.C. architect.
(West Ham, E.).—School, Pretoria Road, for the E.C. (£47,190); H. C. Horswill, Ltd., 50, St. George's Square, Forest Gate, E.
(Euston, N.W.).—Reconstruction, Euston Square station; Met. Rly. Co.
(Stoke Newington, N.W.).—Schools, Mount Pleasant Lane and Stamford Hill; L.C.C. architect.
(Bermondsey, S.E.).—Cottages and flats, The Grange and Bermondsey Street (£24,300); B.C. Works Dept.
(Greenwich, S.E.).—Reconstruction of the Hippodrome; George Coles, architect.
(East Sheen, S.W.).—Development, Cedars estate; T. P. Bennett & Sons, architects.
(Walham Green, S.W.).—Premises, Fulham Road and Garden Row; Walham Green Laundries, Ltd.

LOWESTOFT.—Houses (108), Kirkley Run estate; borough engineer. School, Church End (£19,521); G. H. Carter (Eastern Counties), Ltd.

MANCHESTER.—Premises for District Bank, Ltd., Fountain Street; Jones & Dalrymple, architects.

MERTHYR.—Extensions, 'bus garage; borough engineer.

MIDDLESBROUGH.—Extensions, public baths (£32,207) for the T.C.; Gustavus Bailey, builder, Newcastle-on-Tyne.

MIDDLETON.—Alterations, Palace Kinema; A. Winstanley, architect.

MUIR-OF-ORD.—Bakery and business premises, with electrical work; Mackenzie & Macdonald, architects, Dingwall.

NEWCASTLE.—Houses (177), St. Anthony's estate; city engineer.

OLDHAM.—Extension to central baths (£20,000); borough engineer.

ONGAR.—Houses (48) for the R.D.C.; P. R. B. Pearce, surveyor.

PORTKNOCKIE.—Harbour extension scheme; burgh engineer.

READING.—Extensions, Tilehurst Park Lane and Shinfield Road schools (£14,957) for the borough E.C.; director of education.

REIGATE.—School, South Park housing estate, for the borough E.C.; director of education.

RICHMOND (Surrey).—Extensions, Mogden Isolation Hospital, including observation block, for the Joint Isolatien Hospital Committee; clerk.

RICHMOND (Yorks.).—Conversion of premises into offices for the T.C.; H. Kendall, borough surveyor.

ST. HELENS.—R.C. church, Sutton Manor; Rev. R. Holden, rector of St. Teresa's.

ST. NEOTS (Hunts.).—Houses (50) for the U.D.C.; T. A. Scott, surveyor.

SALFORD.—Schools, Lower Broughton (1,300 places) and Lower Kersal (1,020 places), for the city E.C.; director of education.

SEAHAM HARBOUR.—Council offices; surveyor to U.D.C.

SHOREHAM.—Jetty and bulk storage wharf at harbour; Russian Oil Products, Ltd.

SLOUGH.—Nine shops, Stoke Poges Lane; A. F. Wilmot.

SOUTHAMPTON.—Houses (240), Bassett Green estate; borough engineer.

SOUTHEND-ON-SEA.—Esplanade extension, harbour baths and sports centre scheme; also home for domestic staff, sanatorium, for the T.C.; R. H. Dyer, borough engineer.

SOUTHPORT.—Theatre, Opera House site; borough engineer.

STOKE-ON-TRENT.—Houses (40), Etruria Vale (£15,219); Ball & Robinson. Houses, Meir residential estate; Mr. Watts, architect.

SUNDERLAND.—Quay; borough engineer.

THAKEHAM (Sussex).—Waterworks scheme, with engine, filter house and pumping plant, for the R.D.C.; H. Bertram Nichols, engineer, 13, Victoria Street, Westminster, S.W.

TONBRIDGE.—Electrical plant, isolation hospital, for the R.D.C.; surveyor.

TUNBRIDGE WELLS.—Re-erection of flour mill, Ashurst, for Thomas Caffyn.

TYNEMOUTH.—Senior school, Percy Main, for the E.C.

WALSALL.—Public abattoir; borough engineer. Council schools, Blakenall Heath (£17,000) and Field Street, Bloxwich (£20,000); director of education.

WILTS.—Girls' secondary school, Trowbridge, and extensions, Margaret Stancomb School, for the E.C.; T. Walker, county architect, Trowbridge.

WORCESTER.—Extension of hospital and nurses' home (£90,000); governors, Worcester Infirmary.

WORSBOROUGH (Yorks.)—Houses (100) for the U.D.C.; T. Shield, surveyor.

WREXHAM.—Administrative block, casual ward (£100,000), for Denbighshire Public Assistance Committee; G. Wiles, county architect.